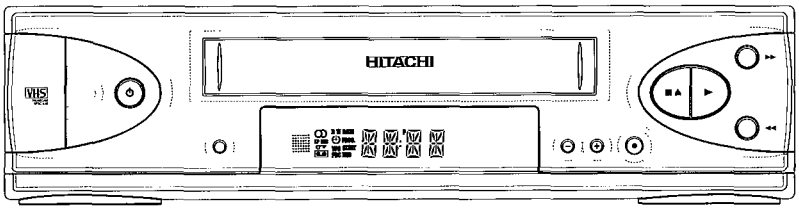
HITACHI

TP | No.0005E

VT-600 Series

SERVICE MANUAL
Wartungsanleitung
Documentation Technique

V18570



VT-F641ENA
VT-F641EUKN
VT-F641EVPS
VT-F652ELN
VT-M602EL
VT-M605EVPS
VT-M610EPV
VT-M610EUK
VT-M631EUK
VT-M631EVPS
VT-M632EL

VHS

This video deck is a VHS type video recorder. For proper operation, only the VHS type cassette must be used.

VHS

Dieser Video-Recorder entspricht dem VHS-Format. Für richtigen Betrieb müssen daher VHS-Magnetband-Casseten verwendet werden.

VHS

Cet appareil est un magnétoscope format VHS. Pour un fonctionnement optimal n'utiliser que des cassettes VHS.

SPECIFICATIONS AND PARTS ARE SUBJECT TO CHANGE FOR IMPROVEMENT
Änderungen der Technischen Daten und Teile im Sinne ständiger Verbesserung vorbehalten.
A des fins d'amélioration, les spécifications et les pièces sont sujets à modifications.

VIDEO CASSETTE RECORDER
Video-Cassettenrecorder
Magnétoscope à cassette

PCS 93501 GB

June 1997 HITACHI HOME ELECTRONICS EUROPE

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Features

	System		Tuning System				Mechanism							Video				Audio			Programming				Special features			Connectors	Cinch connectors		
	Modulator	Splitter for France	Autosearch	Autoinstall	Cable tuner	Tuner only mode	Videoheads	Audioheads mono	Audioheads FM	Winding Time 260s (E180)	Rewind Time 170s (E180)	Tape counter linear		NTSC Playback	VISS (search)	Quick view	Video longplay (8h)	Studio picture control	NICAM	Stereo HIFI	Audio long play (8h)	Daily/weekly	Showview / Video+	VPS / PDC / VPS + PDC	Record prep. mode Scart 2	Child lock	Time/Date download	Backup time of clock (min.)	Scartconnectors	Video in front	Audio in front (left & right)	Audio out rear (left & right)
VT-F641ENA	✔		✔		✔	✔	4	✔	2	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔	✔	SV	VPDC	✔	✔	✔	30	2			✔
VT-F641EUKN	✔			✔			4	✔	2	✔	✔	✔			✔	✔	✔	✔	✔		✔	✔	V+	PDC	✔	✔		30	2			✔
VT-F641EVPS	✔		✔		✔	✔	4	✔	2	✔	✔	✔			✔	✔	✔	✔		✔	✔	✔	SV	VPS	✔	✔		30	2			✔
VT-F652ELN		✔	✔		✔	✔	4	✔	2	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	SV	VPDC	✔	✔	✔	30	2	✔	✔	✔
VT-M602EL		✔	✔		✔		2	✔		✔	✔	✔			✔	✔		✔				✔	SV	VPDC	✔	✔	✔	30	2			
VT-M605EVPS	✔		✔		✔		2	✔		✔	✔	✔			✔	✔		✔				✔	SV	VPS	✔	✔		30	2			
VT-M610EPV	✔		✔		✔		2	✔		✔	✔	✔			✔	✔	✔	✔			✔	✔	SV	VPDC	✔	✔	✔	30	2			
VT-M610EUK	✔			✔			2	✔		✔	✔	✔			✔	✔	✔	✔			✔	✔	V+	PDC	✔	✔	✔	30	2			
VT-M631EUK	✔			✔			4	✔		✔	✔	✔			✔	✔	✔	✔			✔	✔	V+	PDC	✔	✔	✔	30	2			
VT-M631EVPS	✔		✔		✔		4	✔		✔	✔	✔			✔	✔	✔	✔			✔	✔	SV	VPS	✔	✔		30	2			
VT-M632EL		✔	✔		✔		4	✔		✔	✔	✔			✔	✔	✔	✔			✔	✔	SV	VPDC	✔	✔	✔	30	2			

Survey of sets and PCB`s

	QMB - MOTHERBOARD																												TAPE DECK						
	-QMB layout	-PS Power supply	-HA Head amplifier	-DE Deck electronics	-DC Display control	-VS Signal electronic	-AL Audio linear	-IO IN/OUT	-VS-SEC Signal electronic	-FV Frontend	-AF Audio FM	-OSD, FOME, VPS Part	**Deck Control-µP Pos. 7400**	**Display Control-µP Pos. 7201**					***-CINCH Board rear***	***-CINCH Board front***	***-QNIC NICAM Board***	2 video heads, PAL, SECAM	2 video heads, longplay PAL	4 video heads, PAL	4 video heads, SECAM	4 video, 2 audio heads, PAL	4 video, 2 audio heads, SECAM							
Page 3 -	12	14	15	16	17	18	18	19	20	21	22	23	16	17					12/18	26	25	Chapter 4												
	PAL I	PAL BG	SECAM BG	SECAM L/L'									QTDP2-xU	QDCE1-xP	QDCE2-xU	QDCH1-xP	QDCH2-xU	QDCH5-xU	CINCH rear	QBOC1	QNIC	WDQ-P2/0	WDQ-P2/0LP	WDQ-P4/0	WDQ-S4/0	WDQ-P4/2	WDQ-S4/2							
VT-F641ENA		✔											✔					✔	✔		✔					✔								
VT-F641EUKN	✔												✔			✔			✔		✔													
VT-F641EVPS		✔											✔				✔		✔							✔								
VT-F652ELN	✔	✔	✔	✔									✔				✔		✔	✔	✔						✔							
VT-M602EL	✔	✔	✔	✔									✔		✔							✔												
VT-M605EVPS		✔											✔		✔							✔												
VT-M610EPV		✔											✔		✔								✔											
VT-M610EUK	✔												✔	✔									✔											
VT-M631EUK	✔												✔	✔										✔										
VT-M631EVPS		✔											✔		✔																			
VT-M632EL	✔	✔	✔	✔									✔		✔										✔		✔							

(GB) Safety instructions

- Safety regulations demand that the set be restored to its original condition and that components identical with the original types be used.
  Safety components are marked by the symbol ⚠
- All ICs and many other semi-conductors are susceptible to electrostatic discharges (ESD). Careless handling during repair may reduce life drastically. When repairing, make sure that you are conneted with the same potential as the mass of the set via a wrist strap with resistance. Keep components and tools on the same potential.
- A set to be repaired should always be connected to the mains via a suitable isolating transformer.
- Never replace any modules or any other parts while the set is switched on.
- Use plastic instead of metal alignment tools. This in order to preclude short-circuit or to prevent a specific circuit from being rendered unstable.

Remarks

- The direct voltages and oscillograms ought to be measured relative to the set mass.
  EXCEPTION
  At the power supply, the DC voltages and the oscillograms at the primary side are measured to LIVE GND.
- The direct voltages and oscillograms mentioned in the diagrams ought to be measured with a colour bar signal and the picture carrier at 503 25 MHz (C25).
- The oscillograms and direct voltages have been measured in RECORD or PLAY mode
- The semiconductors, which are mentioned in the circuit diagram and in the parts lists, are fully exchangeable per position with the semiconductors in the set, irrespective of the type designation of these semiconductors.

(D) Sicherheitshinweise

- Die Sicherheitsvorschriften erfordern es, daß sich das Gerät nach der Reparatur in seinem originalen Zustand befindet und daß die zur Reparatur benutzten Ersatzteile mit den Originalersatzteilen identisch sind.
  Sicherheits-Bauteile sind mit der Markierung ⚠ versehen
- Alle IC's und Halbleiter sind empfindlich gegen elektrostatische Entladungen (ESD). Unvorschriftmässige Behandlung von Halbleitern im Reparaturfall kann zur Zerstörung dieser Bauteile oder zu einer drastischen Reduzierung der Lebensdauer führen Sorgen Sie dafür, daß Sie sich im Reparaturfall über ein Armband mit Widerstand auf dem gleichen Potential, wie die Masse des Gerätes befinden. Alle Bauteile, Werkzeuge und Hilfsmittel sind auf das gleiche Potential zu legen.
- Ein zu reparierendes Gerät ist immer über einen Trenntransformator an die Netzspannung anzuschließen.
- Bei eingeschaltetem Gerät dürfen keine Module oder sonstige Einzelteile ausgetauscht werden
- Zum Abgleich sind ausschließlich Kunststoffwerkzeuge zu benutzen (keine Metallwerkzeuge verwenden). Dadurch wird vermieden, daß ein Kurzschluß entstehen kann oder eine Schaltung instabil wird.

Anmerkungen

- Die Gleichspannung und Oszillogramme sind gegen Gerätemasse zu messen.
  AUSNAHME
  Beim Netzteil sind die Gleichspannungen und Oszillogramme auf der Primärseite gegen Live GND gemessen.
- Die Gleichspannungen und Oszillogramme angeführt in den Schaltbildern sollen unter folgenden Bedingungen gemessen werden: Farbbalkensignal, Bildträger auf 503.25 MHz (C25)
- Die Oszillogramme und Gleichspannungen sind in RECORD oder PLAY gemessen Die in den Stücklisten aufgeführten Bauteile sind positionsweise voll auswechselbar gegen die Bauteile in dem Gerät, ungeachtet der etwaigen Typenbezeichungen.

(F) Avertissements

- Les normes de sécurité exigent qu'aprés réparation l'appareil soit remis dans son état d'origine et que soient utilisées les piéces de rechange identiques à celles spécifiées.
  Les composants de sécurité sont marqués ⚠
- Tout les IC et beaucoup d'autres semi-conducteurs sont sensibles aux décharger statiques (ESD). Leur longévité pourrait étre considérablement écourté par le fait qu'aucune précaution n'est prise à leur manipulation. Lors de réparations s'assurer de bien étre relié au méme potential que la masse de l'appareil et enfiler le bracelet serti d'une résistance de sécurité. Veiller à ce que les composants ainsi que les outils que l'on utilise soient également à ce potentiel.
- Toujours alimenter un appareil à réparer à travers un transfo d'isolement.
- Ne jamais remplacer les modules ni d'autres composants quand l'appareil est sous tension.
- Pour l'ajustage, utiliser des outils en plastique au lieu d'instruments métalliques. Ceci afin d'éviter les court-circuits et exclure l'instabilité dans certains circuits.

Observations

- La mésure des tensions continues et des oscillogrammes doit se faire par rapport à la terre de l'appareil.
  EXCEPTION
  Sur l'unité d'alimentation la tension continue et l'oscillogramme sont mesurés sur le côte primaire en Live GND.
- La mésure des tensions continues et des oscillogrammes figurant sur le schéma doit se faire dans un signal de barre couleur porteuse image sur 503.25 MHz (C25).
- Les oscillogrammes et tension sont mésurées en mode RECORD ou PLAY.
- Les semi-conducteurs indiqués dans le schéma de principe et à la liste des compostants, sont interchangeables par repère sur ce chassis avec les semi-conducteurs de l'appareil quelle que soit la désignation de type donnée sur ces semi-conducteurs.

(NL) Veiligheidsinstructies

- Veiligheidsbepalingen vereisen, dat het apparaat in zijn oorspronkelijke toestand wordt teruggebracht en dat onderdelen, indentiek aan de oorspronkelijke, worden toegepast
  De veiligheidsonderdelen zijn aangeduid met het symbool ⚠
- Alle IC's en vele andere halfgeleiders zijn gevoelig voor elektrostatische ontladingen (ESD). Onzorgvuldig behandelen tijdens reparatie kan de levensduur drastisch doen verminderen Zorg ervoor, dat U tijdens reparatie via een polsband met weerstand verbonden bent met hetzelfde potentiaal als de massa van het apparaat. Houd componenten en hulpmiddelen ook op ditzelfde potentiaal.
- Sluit een apparaat dat gerepareerd wordt altijd via een scheidingstransformator aan op de netspanning.
- Verwissel nooit modules of andere onderdelen terwijl het apparaat is ingeschakeld
- Gebruik voor het afregelen plastic i.p.v metalen gereedschap Dit om mogelijke kortsluiting te voorkomen of een bepaalde schakeling instabiel te maken

Opmerkingen

- De gelijksspanningen en oscillogrammen dienen gemeten te worden ten opzichte van de apparaat aarde.
- De gelijksspanningen en oscillogrammen vermeld in de schema's dienen gemeten te worden met een kleurbalkensignaal beelddraaggolf op 503 25 MHz (C25).
- De oscillogrammen en gelijksspanningen zijn in RECORD of PLAY mode gemeten.
- De halfgeleiders, die in het pricipeschema en in de stuklijsten, zijn vermeld, zijn per positie volledig uitwisselbaar met de halfgeleiders in het apparaat, ongeacht de typeaanduiding op deze halfgeleiders.

(I) Avvertimenti

- Le prescrizioni di sicurezza richiedono che l'apparecchio sia ricondotto alle condizioni originali e che siano usati ricambi originali.
  Componenti di sicurezza sono marcati con ⚠
- Tutti gli IC e semiconduttori sono sensibili a scariche elettrostatiche (ESD). Noncuranze durante la riparazione di semiconduttori possono danneggiarli o condurre ad una riduzione drastica della durata. Durante la riparazione assicurarsi di essere collegati allo stesso potenziale attraverso un bracciale di protezione contro scariche elettrostatiche. Inoltre tenere anche tutti i componenti e gli attrezzi a questo potenziale.
- Apparecchi da riparare bisogna collegarli sempre via un trasformatore isolante (separatore) alla tensione normale.
- Non scambiare moduli o altri componenti quando l'apparecchio è in funzione.
- Per l'accordo usare soltanto attrezzi di plastica (non usare attrezzi metallici). Cosí si evitano cortocircuiti e collegamenti instabili.

Osservazioni

- Misurare le tensioni continue e gli oscillogrammi riferiendosi alla massa dell'apparecchio.
  ECCEZIONE
  Le tensioni continue e gli oscillogrammi dall'alimentatore sono misurati sulla parte primaria contro GND-Live.
- Le tensioni continue e gli oscillogrammi indicati negli schemi di collegamento devono essere misurati secondo le condizioni seguenti: segnale barre colore, portante dell'immagine su: 503.25 MHz (C25).
- Gli oscillogrammi e le tensioni continue sono misurati in RECORD o PLAYBACK.
- I componenti indicati nelle liste sono intercambiabili con quelli nell'apparecchio nonostante l'eventuale denominazione di modelli.

(E) Avisos

- Las instrucciones de seguridad exigen que después de la reparación el aparato se encuentre en el estado original y que las piezas de repuesto, utilizadas para la reparación, sean idénticas a las originales
  Los componentes de seguridad estan marcados con ⚠
- Todos los IC y semiconductores son sensibles a descargas electrostáticas (ESD). Un tratamiento no conforme a las instrucciones de semiconductores en caso de reparación, podría llevar a la destrucción de estos componentes, o a una reducción drástica de la duración. Tenga cuidado de que, en caso de reparación, estar al mismo potencial que la masa del aparato, por una pulsera con resistencia. Ponga todos los componentes, herramientas y recursos al mismo potencial.
- Para reparar un aparato hay que conectarlo siempre a la alimentación a traves de un transformador de aislamiento.
- Cuando un aparato está en marcha no pueden ser cambiados módulos u otras piezas de repuesto.
- Para los ajustes hay que utilizar exclusivamente herramientas de plástico (nunca herramientas metálicas). Así se evitaran cortocircuitos y circuitos inestables.

Notas

- Hay que medir las tensiones continuas y los oscilogramas contra la masa del aparato.
  UITZONDERING.
  Bij het netgedeelte zijn de gelijkspanningen en oscillogrammen aan de primaire kant tegen Live GND gemeten.
- Las tensiones continuas y los oscilogramas mencionados en los esquemas tienen que ser medidos de manera siguiente. señal barra de color portadora de imagen en 503.25MHz (C25)
- Los oscilogramas y las tensiones continuas son medidas en „RECORD" y „PLAYBACK"
- Los componentes mencionados en las listas se los puede cambiar por los componentes en el aparato, a pesar de eventuales designaciones de tipos.

(GB) WARNING FOR LITHIUM BATTERIES!

Lithium batteries, if incorrectly used (excessive heat, wrong connection of terminals, short circuit represent a danger of explosion!
Lithium batteries must be replaced only by original spare parts

(D) WARNHINWEIS ZU LITHIUM-BATTERIEN!

Bei fascher Handhabung (Uberhitzung, Falschpolung oder Kurzschluß) der Lithium-Batterien besteht Explosionsgefahr!
Lithium-Batterien dürfen nur gegen Originalersatzteile getauscht werden.

(F) ATTENTION!

Pile au lithium.
Danger d'explosion si traitée incorrectement. Ne peut être remplacée que par un spécialiste (comme décrit dans les instructions de réparation).

(NL) OPGELET MET LITHIUM-BATTERIJEN!

Bij foutieve behandeling (oververhitting, foutieve poling of kortsluiting) van lithium-batterijen bestaat er explosiegevaar! Lithium-batterijen mogen slechts door originele onderelen vervangen worden.

(I) ATTENZIONE CON LE PILE AL LITIO!

In caso di utilizzo errato (surriscaldamento, errata posizione dei poli o cortocircuito) delle pile al litio consiste pericolo di esplosione! Le pile al litio si possone soltituire solo con pezzl di ricambio originali.

(E) AVISO!

Bateria de litio.
Por una inadecuada intervención puede explotar.
Solo debe ser cambiada por una persona con conocimientos técnicos (como en la guía de reparación se describe).

(DK) ADVARSEL!

Lithium batteri. Eksplosionsfare.
Udskiftning ma kun foretages af en sagkyndig, og som beskrevet in servicemanualen.

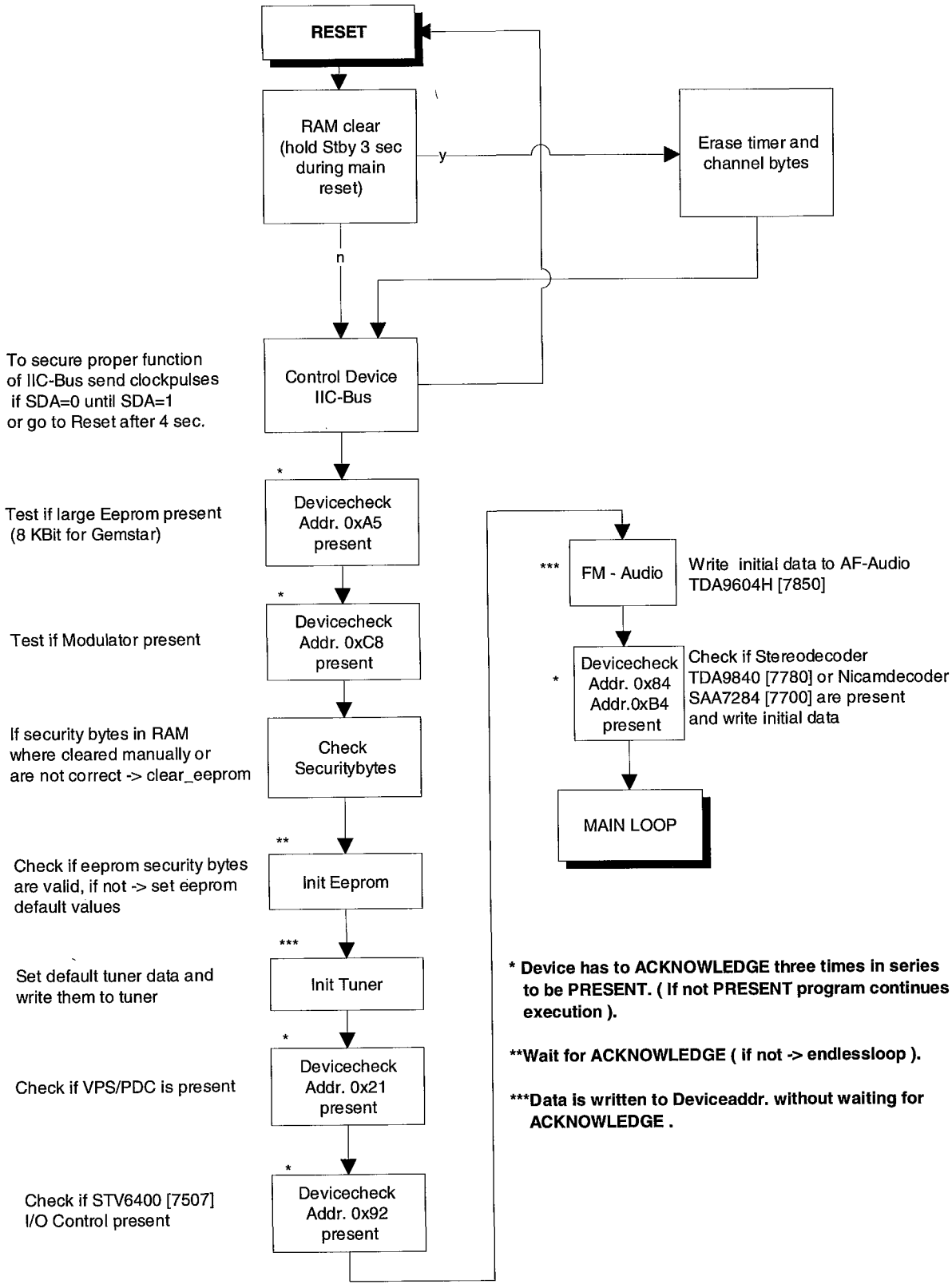
(S) VARNING!

Eksplosionsfara vid felaktigt batteribyte!
Använd samma batterityp eller ekvivalent typ som rekommenderas av apparattillverkaren

(SF) VAROITUS!

Paristo voi räjähtää, jos se on virheellisesti asennettu!
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin.

Start - up Phase of the display control - µP


RESET
RAM clear (hold Stby 3 sec during main reset)
y
Erase timer and channel bytes
n
To secure proper function of IIC-Bus send clockpulses if SDA=0 until SDA=1 or go to Reset after 4 sec.
Control Device IIC-Bus
*
Test if large Eeprom present (8 KBit for Gemstar)
Devicecheck Addr. 0xA5 present
*
Test if Modulator present
Devicecheck Addr. 0xC8 present
If security bytes in RAM where cleared manually or are not correct -> clear_eeprom
Check Securitybytes
**
Check if eeprom security bytes are valid, if not -> set eeprom default values
Init Eeprom
***
Set default tuner data and write them to tuner
Init Tuner
*
Check if VPS/PDC is present
Devicecheck Addr. 0x21 present
*
Check if STV6400 [7507] I/O Control present
Devicecheck Addr. 0x92 present
***
FM - Audio
Write initial data to AF-Audio TDA9604H [7850]
*
Devicecheck Addr. 0x84 Addr.0xB4 present
Check if Stereodecoder TDA9840 [7780] or Nicamdecoder SAA7284 [7700] are present and write initial data
MAIN LOOP
* Device has to ACKNOWLEDGE three times in series to be PRESENT. (If not PRESENT program continues execution).
**Wait for ACKNOWLEDGE (if not -> endlessloop).
***Data is written to Deviceaddr. without waiting for ACKNOWLEDGE .

(GB)

TECHNICAL DATA

Mains voltage	220 - 240 V, +/- 10%
Mains frequency	45 - 65 Hz
Power consumption:	
without Low Power Standby	mono 12.5 W during operatio HiFi 16 W during operation
with Low Power Standby	mono 9.5 W HiFi 11 W
Ambient temperature	+10°C to +35°C
Relative humidity	20 - 80 %
Dimensions	380 x 260 x 94 mm
Weight	3,7 kg
Fast forward/rewind time (turbo)	typ. 100s (E180 cass)
Position of use	horizontally, max 15°
Video resolution	≥240 lines
Audio	Audio SP: Linear Audio 80Hz - 10kHz (≤8dB) Audio LP: Linear Audio 80Hz - 5kHz (≤8dB) Stereo FM Audio 20Hz - 20kHz (≤3dB)

(D)

TECHNISCHE DATEN

Netzspannung	220 - 240 V, +/- 10%
Netzfrequenz	45 - 65 Hz
Leistungsaufnahme:	
Standby	mono 12.5 W during operatio HiFi 16 W during operation
Standby mit geringem Verbrauch	mono 9.5 W HiFi 11 W
Raumtemperatur	+10°C to +35°C
Relative Luftfeuchtigkeit	20 - 80 %
Abmessungen	380 x 260 x 94 mm
Gewicht	3,7 kg
Vor-/Rückspulzeit (turbo)	typ. 100s (E180 cass)
Betriebslage	horizontally, max 15°
Video-Auflösung	≥240 lines
Audio	Audio SP: Linear Audio 80Hz - 10kHz (≤8dB) Audio LP: Linear Audio 80Hz - 5kHz (≤8dB) Stereo FM Audio 20Hz - 20kHz (≤3dB)

(F)

CARACTERISTIQUES

Tension secteur	220 - 240 V, +/- 10%
Fréquence	45 - 65 Hz
Puissance absorbée	mono 12.5 W during operatio HiFi 16 W during operation
mode veille normal	mono 9.5 W HiFi 11 W
mode veille faible consommation	< 6 W standby
Température ambiante	+10°C to +35°C
Humidité relative	20 - 80 %
Encombrement	380 x 260 x 94 mm
Poids	3,7 kg
Temps (re-)bobinage (turbo)	typ. 100s (E180 cass)
Position d'emploi	horizontally, max 15°
Puissance absorbée	≥240 lines
Audio SP: Linear Audio	80Hz - 10kHz (≤8dB)
Audio LP: Linear Audio	80Hz - 5kHz (≤8dB)
Stereo FM Audio	20Hz - 20kHz (≤3dB)

(NL)

TECHNISCHE GEGEVENS

Netspanning	220 - 240 V
Netfrequentie	45 - 65 Hz
Opgenomen vermogen:	mono 12.5 W during operation HiFi 16 W during operation
zonder Low Power Standby	mono 9.5 W during standby HiFi 11 W during standby
met Low Power Standby	< 6 W standby
Omgevingstemperatuur	+10°C to +35°C
Relatieve vochtigheid	20 - 80 %
Afmetingen	380 x 260 x 94 mm
Gewicht	3,7 kg
Vooruit/terugspoeltijd (turbo)	typ 100s (E180 cass.)
Gebruikspositie	horizontally, max 15°
Opplossend vermogen	≥240 lines
Audio	Audio SP. Linear Audio 80Hz - 10kHz (≤8dB) Audio LP. Linear Audio 80Hz - 5kHz (≤8dB) Stereo FM Audio 20Hz - 20kHz (≤3dB)

(E)

DATOS TECNICOS

Tensión de red	220 - 240 V
Frecuencia de red	45 - 65 Hz
Consumo de potencia.	mono 12.5 W during operation HiFi 16 W during operation
sin standby de bajo consumo	mono 9.5 W during standby HiFi 11 W during standby
con standby de bajo consumo	< 6 W standby
Temperatura ambiente	+10°C to +35°C
Humedad relativa	20 - 80 %
Dimensiones	380 x 260 x 94 mm
Peso	3,7 kg
tiempo de (re-)bobinado (turbo)	typ 100s (E180 cass.)
Posición de uso	horizontally, max 15°
Resolución video	≥240 lines
Audio	Audio SP. Linear Audio 80Hz - 10kHz (≤8dB) Audio LP. Linear Audio 80Hz - 5kHz (≤8dB) Stereo FM Audio 20Hz - 20kHz (≤3dB)

(I)

DATI TECNICI

Tensione di alimentazione	220 - 240 V
Frequenza di rete	45 - 65 Hz
Potenza assorbita:	mono 12.5 W during operation HiFi 16 W during operation
in attesa non a basso consumo	mono 9.5 W during standby HiFi 11 W during standby
in attesa a basso consumo	< 6 W standby
Temperatura ambiente	+10°C to +35°C
Umiditá relativa	20 - 80 %
Dimensioni	380 x 260 x 94 mm
Peso	3,7 kg
Tempo di (ri-)avvolgimento (turbo)	typ 100s (E180 cass.)
Posizione di funzionamento	horizontally, max 15°
Risoluzione video	≥240 lines
Audio SP. Linear Audio	80Hz - 10kHz (≤8dB)
Audio LP. Linear Audio	80Hz - 5kHz (≤8dB)
Stereo FM Audio	20Hz - 20kHz (≤3dB)

Euroconnector (AV1) SCART plug 1

Connection to TV, monitor, projection TV

Pin 1	ARO (audio right out)	500 mV_{rms} +/- 3 dB	R_{out} 1 kOhm
Pin 2	ARI (audio right in)	0,2 V_{rms} to 2V_{rms}	R_{in} 10 kOhm
Pin 3	ALO (audio left out)	500 mV_{rms} +/- 3 dB	R_{out} 1 kOhm
Pin 6	ALI (audio left in)	0,2 V_{rms} to 2 V_{rms}	R_{in} 10 kOhm
Pin 7	Blue (out) **)		
Pin 8	Switching output:	(with R_{load} = 10kOhm, C_{load} < 2nF) low 2 V high 9.5 V rise time. 5 ms	
Pin 11	Green (out) **)		
Pin 15	Red (out) **)		
Pin 16	Blanking (out) **)	loop through enabled during standby, view-mode	
Pin 19	CVBS II (video out)	1 V_{pp} +1/-2dB	R_{out} 75 Ohm
Pin 20	CVBS I (video in)	1 V_{pp} +3/-3dB	R_{in} 75 Ohm

**) passive loop through from AV2

Euroconnector (AV2) SCART plug 2

Connection to decoder, SAT tuner, video disc, 2nd VCR

Pin 1	ARO (audio right out)	500 mV_{rms} +/- 3 dB	R_{out} 1 kOhm
Pin 2	ARI (audio right in)	0,2 V_{rms} to 2 V_{rms}	R_{in} 10 kOhm
Pin 3	ALO (audio left out)	500 mV_{rms} +/- 3 dB	R_{out} 1 kOhm
Pin 6	ALI (audio left in)	0,2 V_{rms} to 2 V_{rms}	R_{in} 10 kOhm
Pin 7	Blue (in) *)		
Pin 8	Switching input only	low 2 V (low) high: 4.5 V (high)	R_{in} 10 kOhm R_{in} 10 kOhm
Pin 11	Green (in) *)		
Pin 15	Red (in) *)		
Pin 16	Blanking (in) *)	loop through enabled during standby, view-mode	
Pin 19	CVBS II (video out)	1 V_{pp} +1/- 2dB	R_{out} 75 Ohm
Pin 20	CVBS I (video in)	1 V_{pp} +3/-3 dB	R_{in} 75 Ohm

*) passive loop through to Euroconnector AV1

Cinch Audio/Video input on front panel (OPTION)

Audio:

AINFR (audio right in) red	0.2 V_{rms} to 2 V_{rms}	typ 500 mV_{rms}
AINFL (audio left in) white	0 2 V_{rms} to 2 V_{rms}	typ 500 mV_{rms}
Input impedance	47 kOhm	

Video:

VFR yellow	1 V_{pp} + 3 / -3 dB
Input impedance	75 Ohm

Cinch Audio Out Rear (OPTION)

AOUT1R (audio right out) red	500 mV_{rms} +/- 3 dB R_{out} 1 kOhm
AOUT1L (audio left out) white	500 mV_{rms} +/- 3 dB R_{out} 1 kOhm

This outputs are in parallel with the corresponding outputs on Euroconnector 1

TUMOD

Modulator:

Frequency range loop through	45 MHz - 860 MHz
Gain: ANT IN - TV OUT	2 dB + 3 / -2 dB
ANT IN - TUN OUT	2 dB + 3 / -2 dB
Switch for RF input attenuation	NO
Frequency range out (tuned by IIC bus)	Ch 21 - Ch55

Tuner

Frequency range	43 MHz - 860 MHz
	for UK 450 MHz - 860MHz
Input voltage max	< 100 dBµV
min.	> 60 dBµV

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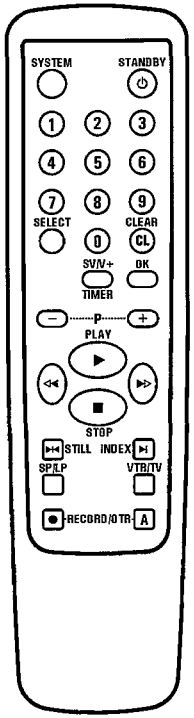
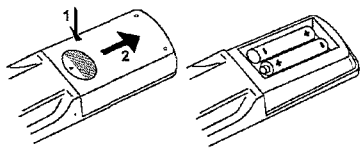
OPERATING INSTRUCTIONS IN BRIEF

The remote control





SYSTEM Special function

STANDBY ⏻ Standby

0-9 Digit buttons 0-9

SELECT Function selector

CLEAR (CL) Reset, clear

SV/V+/TIMER 'VIDEOPlus' or 'TIMER' programming

OK Confirm button

P− Down/Minus, programme number

P+ Up/Plus, programme number

PLAY ▶ Playback

◀◀ Rewind/Reverse scanning

▶▶ Forward wind/ Forward scanning

STOP ■ Pause/Stop, Tuner-mode

STILL ▶◀ Still picture

INDEX ▶| Index search

SP/LP (SP/LP) selection

VTR/TV TV monitor function

RECORD/OTR ● Record

A Activate record button (RECORD/OTR ● and A button simultaniously).

Front of the video recorder

⏻ Standby

INSTALL Installation button

PROG.− Down/Minus, programme number

PROG.+ Up/Plus, programme number

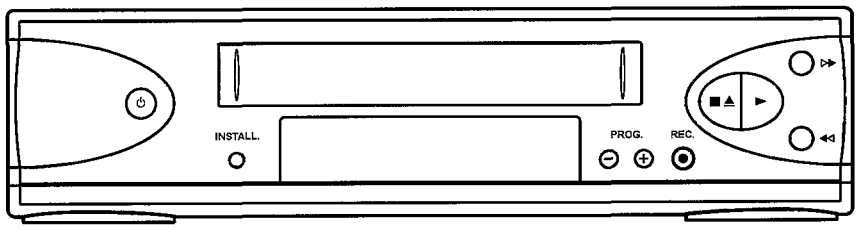
REC. ● Record

■⏏ Stop/Cassette eject

▶ Playback

▶▶ Forward wind/ Forward scanning

◀◀ Rewind/Reverse scanning



Saving energy

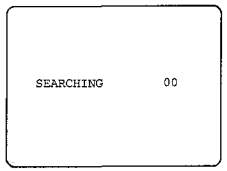
You can choose between two methods of switching to standby.
1. Normal method - switch to standby using the STANDBY button. The clock time remains displayed. If the clock has not been set, '--:--' appears in the display.
2. To save energy - Press the STANDBY button twice. The clock time disappears from the display.

Emergency interrupt

Both the set and the remote control have an 'Emergency interrupt' button. You can use the STANDBY button to interrupt any function.
Whenever you have operating problems you can simply interrupt the function and start again.
You can practise operating your set without any worries. No matter which buttons you press, you cannot damage it.

Automatic Channel Search

1. Press the AUTOINSTALL button on the video recorder.
2. Select the required OSD language.
   The video recorder display always shows English text.
3. Confirm with the OK button.
4. The automatic channel search starts.



5. Wait until all the TV channels have been found. This may take several minutes.
6. Adjust 'TIME', 'YEAR', 'MONTH', 'DATE' if required.
7. Confirm each entry with the OK button.

How to search for a TV channel manually, you read in chapter 4 'SPECIAL FEATURES', 'Manual channel search'

Note: If TV channels have been stored already, select and confirm the 'AUTOSEARCH' line after step 1. The following procedure will be reduced to steps 4 and 5.

Autoinstall (only for UK)

The video recorder will search for all TV programmes. It stores TV programmes found in the following sequence: BBC 1, BBC 2, ITV, CH 4, CH 5, SKY, others.

Setting the clock

Time/Date Download:
If a television programme which transmits TXT/PDC is stored with programme number 'P 01', time (from TXT) and date (from PDC) will automatically be taken from the TXT/PDC information.

Synchro Time:
If a television programme which transmits TXT (videotext/teletext/top/flof/fastext/supertext and so forth) is stored with programme number 'P 01', the correct time will automatically be taken from the TXT information.

1. Press the AUTOINSTALL button on the videorecorder.
2. Confirm the line 'CLOCK'
3. Adjust 'TIME', 'YEAR', 'MONTH', 'DATE' if required.
4. Confirm each entry.

Automatic Channel Allocation FOLLOW TV

With this function the video recorder maintains the same programme sequence as on the TV set. This only functions if the video recorder (socket EXT.1) and the TV set are **connected via a scart cable**.

1. Switch on the TV set.
2. Press the AUTOINSTALL button on your video recorder.
3. Select and confirm 'FOLLOW TV'
   If the video recorder recognizes that the TV set has been connected via a scart cable, 'TV01' appears in the display.
4. Select programme number '1' **on the TV set**.
5. Confirm using the video recorder-remote control. The video recorder compares the TV channels on the TV set and the video recorder.
   If the video recorder found the same TV channel as the TV set, then it stores it at 'P 01'
6. Wait until e.g.. 'TV02' appears in the display.
7. Select, **on the TV set**, the next programme number, e.g.. '2'.
8. Confirm with the video recoder-remote control.
9. Repeat steps 6 to 8 until all TV channels have been allocated.
   To finish, press the STANDBY button.

Note: If, at step 3 'NOTV' (no signal from TV set) appears in the display, the TV channels can not be allocated automatically. Then read further in chapter 4, section 'Manual channel number allocation'.
* If you allocated the wrong TV-channel at step 5 or 8 you can go back one step with the CLEAR (CL) button.

PLAYBACK

Instant View

If, during wind/rewind, you want to have a quick access to picture scanning, use the 'Instant View' function. If you hold the ◁◁ (Rewind) or ▷▷ (Wind) button during wind or rewind, you will switch to picture scanning. If you release the buttons, the video recorder will automatically switch back to rewind or wind again.

Notes: Some functions switch off automatically after a while (e.g.. Pause, Still Picture, Scanning). This helps to protect the cassette and prevent unnecessary power consumption.
* The picture quality will deteriorate during Picture Scanning. The sound is turned off.
* With this set you can play back cassettes that have been recorded on other video recorders in the NTSC standard. This only works for television sets which are suitable for a picture frequency of 60 Hz.
During NTSC-play back some special features (e.g. still picture) are not possible.

Still picture (2 Video Heads)

1. Press the STILL button. You see a still picture. Interference stripes will appear on the screen.
2. Each time you press STILL again, the picture will move on one step.

Still picture/Slow motion (4 Video Heads)

1. Press the STILL button. A still picture appears on the screen.
2. Each time you press STILL again the picture will move on one step.
3. Hold the STILL button. The picture will be played in super-slow motion.
4. Press the ▷▷ button several times. You have a choice of several playback speeds. When you press the ◁◁ button several times you will return to the still picture. There is no sound during slow motion playback.

Note: If the still picture vibrates vertically, hold the P− or the P+ button at step 1 until the vibration is minimal. This setting will be stored automatically. Please note, however, that interference may still occur with poor quality cassettes.

Tape position/Index search

Tape position: The elapsed playback time, given to the hour and minute, appears in the display.

Relative Linear Counter:
If you want to set the indicator to '0:00' , press the CLEAR (CL) button.
When you insert a cassette, the indicator is automatically set to '0:00'

Absolute Linear Counter:
When you load a cassette, the video recorder must first calculate the playing time. Therefore, '-:--' appears first and only after the tape has been running for a few seconds the playing time will be shown.
The playback time displayed can be incorrect when using camcorder cassettes or with cassettes made for NTSC-VHS equipment.

Index search: At the beginning of each recording, the video recorder marks the tape with a code mark. You can search for these code marks on the tape. Once the video recorder finds the code mark or a blank space it will automatically switch to playback.

1. Press the INDEX▶| button and then press the ▶▷ button to select the next code mark or the ◁◀ button for the previous code mark.

Note: You cannot use the function 'Index search' with recordings made on another video recorder that does not have this code mark function.

Eliminating picture interference/ Cleaning function

1. During playback, hold the P+ button until 'TRAC' (tracking) appears in the display.
2. Hold the P+ or P− button until the playback quality is at its best.
3. Wait a few seconds, until 'TRAC' disappears from the display. This setting will remain until you remove the cassette.
4. If horizontal lines still appear on the screen, use the Cleaning function:

Cleaning function: During playback, hold the PLAY▶ 'HEAD' (video head cleaning) appears in the display. The video heads are being cleaned. The video recorder automatically switches back to playback.

Note: Some hired cassettes may have a poor picture/sound quality. This is not a fault in your set.

Note: During picture scanning, still picture and slow motion colour playback may be poor.
* You will obtain the best picture quality when recording at standard speed ('SP').

RECORDING

OTR - recording:
If you do not want to record to the end of the cassette, press the RECORD ◉ button again. The display shows at what time the recording will stop. With each subsequent press of the RECORD ◉ button you can add 30 minutes to this time.
You can return to the normal recording status by pressing the CLEAR (CL) button. During playback, search for the correct position on the tape and then press the ■STOP/▲EJECT button. ▮▮ will appear in the display. Now you can start recording as usual by pressing the RECORD ◉ button.

Display:
During Stop ■ or Pause ▮▮ you can switch between the display for TV-channel name and tape position, using the OK button.

Direct Record

Do you want to record a television transmission which you are just viewing?
Press the RECORD ◉ button with the video recorder **switched to standby.** The video recorder takes the current channel number of the television by means of the scart cable and starts recording.

Note: For 'Direct Record' to function, it must be switched on. To do so, press the AUTOINSTALL button. Select and confirm 'DIRECT RECORD' . Select and confirm 'ON'
After the confirmation the video recorder switches to standby automatically.
* Not all external equipment is suitable for using the 'Direct Record'-function (e.g. some satellite receivers, decoders).
* Don't select another programme number on your television set, until 'OK' appears in the display of your video recorder. This can take up to one minute.

How to programme a recording

The video recorder needs the following information for every programmed recording:

* the date on which the recording is to be made
* the programme number for the TV channel
* the start and stop time of the recording
* 'PDC' or 'VPS' on or off

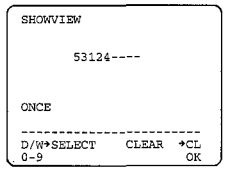
The set stores all the information mentioned above in what is known as a TIMER block. You can programme up to 6 TIMER blocks, one month in advance.

With **'PDC'** (Programme Delivery Control) or **'VPS'** (Video Programming System), the TV station controls the beginning and the length of the programmed recording. This means that the video recorder switches itself on and off at the **right time** even if a TV programme you have programmed begins earlier or finishes later than expected.
Usually the start time is the **same** as the PDC or VPS time. If, however, in the TV guide, in addition to a TV programme's start time, a different PDC or VPS time is given, e.g.. '20.15 (PDC or VPS 20.14)', you have to enter '20.14' as the start time **exactly to the minute.**
If you want to enter a time that differs from the PDC or VPS time, you have to switch off 'PDC' or 'VPS'

Programming with 'SHOWVIEW'

All the information required for a programming is contained encoded in the SHOWVIEW code.

1. Switch on the TV set.
2. Press the TIMER ◴ button on the remote control.
3. Please enter the SHOWVIEW code (up to 9 digits) printed in your TV guide next to the start time of a TV programme.
If you make a mistake, clear with the CLEAR (CL) button.



4. If you want to programme at daily or weekly intervals, press the SELECT button until 'D-DAILY' (daily intervals) or 'W-WEEKLY' (weekly intervals) appears on the TV screen. The 'daily intervals' function can only be used for recordings to be made from Mondays to Fridays inclusive.
5. Confirm the entries with the OK button. The resultant data appear on the TV screen.

Note: If you use SHOWVIEW for the first time for this TV channel, the 'SELECT PROG' line appears when you confirm the SHOWVIEW code. Select and confirm the programme number for the TV programme required.
* Switch 'PDC' or 'VPS' (V/P) on or off with the SELECT button.
* If you wish to set a later end time for a recording, press the P+ button at step 5. With each press on the P+ button you add 15 minutes to the time.
* If e.g.. '20:00' appears in the display, please set the clock.

6. Finally, press the OK button. Programming is now complete.
The data has been stored in a TIMER block.

❼ Make sure that a cassette without erase protection has been loaded. Switch to standby with the STANDBY button.
A programmed recording will only function when the video recorder is **switched to standby** with the STANDBY button.

Note:
* SHOWVIEW Aerial-code numbers: With this set, SHOWVIEW aerial-code numbers will be allocated automatically.

Programming recordings manually (SHOWVIEW/VIDEOPlus +)

❶ Switch on the TV set. Press the TIMER button **twice**.

Programming recordings manually (without SHOWVIEW/VIDEOPlus +)

❶ Switch on the TV set. Press the TIMER button.

❷ Select a free TIMER block. Press the TIMER button.

❸ With the TIMER button you can select between the entries 'DATE' (date), 'PROG' (programme number), 'START' (start time) and 'END' (stop time).
You can enter or adjust data. Confirm each entry with the TIMER button.
You can switch 'VPS/PDC' (V/P) on and off at step 'START' with the SELECT button.
You can select between 'D' (daily intervals) or 'W' (weekly intervals) at step 'DATE' with the SELECT button.

❹ Finally, press the OK button. Programming has now been completed.

❺ Make sure that a cassette without erase protection has been loaded. Switch to standby with the STANDBY button.

Note:
* **Clear a TIMER block:** At step ❶ select the TIMER block that you want to clear. Press the CLEAR (CL) button.
If e.g.: '20:00' appears in the display, the clock must be set.

Important programming notes

When recordings have been programmed, TIMER appears in the display.
The programmed recording will always be made at the recording speed (SP/LP) that **at the time** has been selected on the video recorder.
You cannot operate the set manually while a programmed recording is being made. If you want to interrupt the programmed recording, press the STANDBY button.
If the video recorder is switched on a few minutes before a programmed recording is due to take place, 'TIMER RECORD' will flash on the TV screen.
If the end of the cassette is reached during a programmed recording, the video recorder automatically ejects the cassette.
If you forget to load a cassette, after programming the recording, 'NO CASSETTE' will appear on the TV screen for a few seconds.
If you insert a cassette with erase protection, after programming the recording, 'PROTECTED CASSETTE' will appear on the TV screen for a few seconds.
The cassette will then be ejected.
When all TIMER blocks have been programmed, 'TIMER FULL' appears on the TV screen at step ❶.
If 'CODE ERROR' appears on the TV screen, the SHOWVIEW code was incorrect or the date was incorrectly entered. Repeat the entry or end with the STANDBY button.
With programming at daily intervals, the first recording must take place within a week.
If 'DAILY ERROR' appears on the TV screen, the date was incorrectly entered. Programming at daily intervals can only be used for recordings to be made from Mondays to Fridays inclusive.
Programme number 'E1' is provided for programmed recordings from external sources (via the EXT.1 scart socket).
Programme numbers 'E1' and 'E2' are provided for programmed recordings from external sources (via the EXT.1 or EXT.2 scart socket).

SPECIAL FEATURES

Tuner mode

You can also use your video recorder as a TV receiver (tuner).

❶ Hold the STOP ■ button, until [] appears in the display.

❷ Choose the required programme number with the P− or P+ button or with the 0-9 buttons.

❸ Switch the video recorder to standby by pressing the STANDBY button when you no longer want to watch television.

Sound track selection (only HIFI sets)

You can select the sound track. This is of particular interest when the audio transmissions are multilingual.

❶ Press the SELECT button. The current setting will appear in the display. By pressing the SELECT button several times you can select from the four possibilities displayed ('STEREO' ,'RIGHT' ,'LEFT' ,'MONO').

Note: During playback you can select a fifth possibility: the 'MIXED' mode. In this mode you can play back the mono sound of the normal (linear) audio track together with the sound of the stereo audio track. This can be used for playing back a recording dubbed on another video recorder.
* If there is no stereo sound recorded on the cassette, the video recorder automatically switches over to mono sound.

Changing the TV system

If you play back recordings made on other video recorders or if you record from an external source, the automatic TV system switch-over may not always work properly.

❶ **Before** recording, or **during** playback, select the TV system with the SYSTEM button.

❷ If you select a different programme number, or eject the cassette, the video recorder switches back to 'automatic'

Externally controlled TIMER recording

Do you have another device, e.g. a satellite receiver, which can control other equipment by a Programming function? This video recorder can be remote-controlled via socket EXT.2 , by means of a scart cable.

❶ Insert a cassette. Switch to standby with the STANDBY button.

❷ Hold the MONITOR button until 'REC.P' appears in the display.

❸ If you want to interrupt this function **before** the recording has actually started, hold the MONITOR button until the video recorder switches to standby.

❹ If you want to interrupt this function **while** a recording is being made, press the STANDBY button.

Child lock (RT174)

❶ With the video recorder switched on, press the STANDBY button on the remote control **for a few seconds** until appears in the video recorder display. Keep the remote control in a safe place.

❷ When you want to switch off the child lock, press the STANDBY button again **for a few seconds** until disappears from the video recorder display.

Note: If a button is pressed with activated child lock, appears in the display for a few seconds.
* Programmed recordings are made despite the child lock and cannot be interrupted.

Child lock (RT170)

1. With the video recorder switched on, press the STANDBY and the SELECT button on the remote control **for a few seconds** until ⚿ appears in the video recorder display.
   Keep the remote control in a safe place.

2. When you want to switch off the child lock, press the STANDBY and the SELECT button again **simultaniously, for a few seconds** until ⚿ appears in the video recorder display.

Note: If a button is pressed with activated child lock, ⚿ appears for a few seconds in the display.
* Programmed recordings are made despite the child lock and cannot be interrupted.

On Screen Display (OSD)

You can switch the On Screen Display (OSD) on or off.

1. Press the AUTOINSTALL button on the video recorder.
2. Select and confirm 'OSD'
3. Select and confirm 'ON' or 'OFF'

Note: With the OK button you can superimpose the actual operating mode on the TV screen.

Channel number or frequency display

You can switch between the display for 'channel number' or 'frequency' for manual channel search.

1. Press the AUTOINSTALL button.
2. Select and confirm 'CHANNEL/FREQUENCY'
3. Select and confirm 'CHANNEL' or 'FREQUENCY'

Manual channel search

In certain cases the Automatic Channel Search may not be able to find all of the TV channels (e.g. coded TV channels). You can then use this manual method to set the channels.

1. Press the AUTOINSTALL button on the video recorder.
2. Select and confirm 'MANUAL SEARCH'
3. Hold the P+ button until you have found the right TV channel. A changing channel number or frequency will appear on the TV screen.
4. Confirm with the OK button.
5. Select and confirm the programme number that you wish to allocate to this TV channel (e.g.. 'P 01').
6. If you want to allocate more TV channels, repeat steps 3 to 5 until all TV channels have been stored.
7. To end, press the STANDBY button.

Note: Channel number or frequency can also be entered directly at step 3, using the 0-9 buttons.
* To enter a special/hyperband channel, first enter the channel digit '9'. The indication changes from 'CH' to 'CA'. For example, for special channel 'S 30', enter '9 30'.
* **Allocating a decoder:** If you want to allocate a decoder, press the INDEX button at step 3 until 'DEC' appears in the display.
* This video recorder can receive HI-FI sound transmissions in 'NICAM'. At step 3, you can switch 'NICAM' off or on with the SELECT button.
* If the picture or sound quality is poor, you might have selected the wrong TV system. Press the SYSTEM button at step 3 to change the TV system.

Manual Channel Number Allocation

You can allocate any desired programme number to the TV channels stored by the 'Automatic Channel Search'.

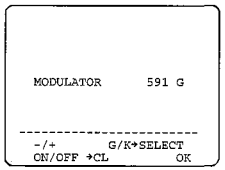
1. Press the AUTOINSTALL button.
2. Select and confirm 'CHANNEL ALLOCATION'
3. Use the P− or P+ button, to select the TV channel on the TV screen, to which you wish to allocate a programme number (starting with 'P 01').
4. Confirm this allocation.
   If you wish to allocate further programme numbers, repeat step 3 and step 4 until you allocated a programme number to all the required TV channels.
5. To end press the STANDBY button.

Note: If you want to delete an **unwanted** TV channel, press the CLEAR (CL) button at step 3.
* **Monitor function:** You can switch to and fro between TV reception and video recorder reception with the MONITOR button. This only functions when you used a scart cable to connect the video recorder to your TV set and if your TV set responds to this switch-over.

Playback via the aerial cable

If you do not wish to use a scart cable, the **aerial cable which is already connected** will act as the connection between your TV set and the video recorder. Ensure that the video recorder is connected to the mains supply.

1. Switch on your TV set and select the programme number that you have earmarked for video playback. (see operating manual for your TV set).
2. Ensure that **no** cassette has been loaded. With the video recorder **switched to standby**, hold the SYSTEM button for a few seconds until a modulator frequency e.g.: 'G591'(UHF-channel 36) appears in the display. The video recorder transmits a test picture.
3. Tune in the TV set in the UHF wave band until this picture appears.



4. Switch the video recorder to standby with the STANDBY button.
   If you have interrupted making standard settings as described in Chapter 1, 'INSTALLATION', turn to that chapter to continue making the standard settings.

Note: This modulator frequency might already be occupied by another TV station in your reception area, e.g. 'Channel 5'. In this case you will find that the picture quality on your TV set will be poor when receiving one or more TV channels.
* **Adjusting the modulator frequency:** If the picture quality only deteriorates when the video recorder is switched on, adjust the modulator frequency. The frequency can be adjusted at step 2 with the P− or the P+ button. Confirm the adjusted frequency with the OK button.
* **Switching off the modulator:** If you **cannot eliminate** picture or sound interference using the above method you can switch off the built-in modulator. You should only do this if you have connected the video recorder to the TV set using a scart cable. 'Playback via the aerial cable' is **not** possible when the modulator is switched off.
At step 2, press the CLEAR (CL) button for several seconds until 'MOFF' (modulator switched off) appears in the display. You can switch back again in the same way.
* **The GK switch:**
If you don't have sound during playback, switch to the other TV system on the video recorder. At step 2, select between e.g.: 'K591' (TV system SECAM-D,K) and e.g.. 'G591' (TV system PAL-B,G) with the SELECT button.

TOOLS FOR ERROR DIAGNOSIS

Replacement procedure for leadless components (chip)

The following procedures are recommended for replacing leadless components used in this unit

1. Preparation for replacement

a. Soldering iron
Use a pencil-type soldering iron that uses less than 30W

b. Solder
Use Eutectic solder
(Tin 63%, Lead 37%)

c. Soldering time
Maximum 4 seconds.

Note:
a. Leadless components must not be re-used after removal.

b. Excessive mechanical stress and rubbing of the component electrode must be avoided

2. Removing the leadless components

Grasp the leadless component body with tweezers and alternately apply heat to both electrodes When the solder on both electrodes has melted, remove leadless component with a twisting motion

Note:
a. Do not attempt to lift the component off the board until the component is completely disconnected from the board with a twisting motion

b. Be careful not to break the copper foil on the printed circuit board

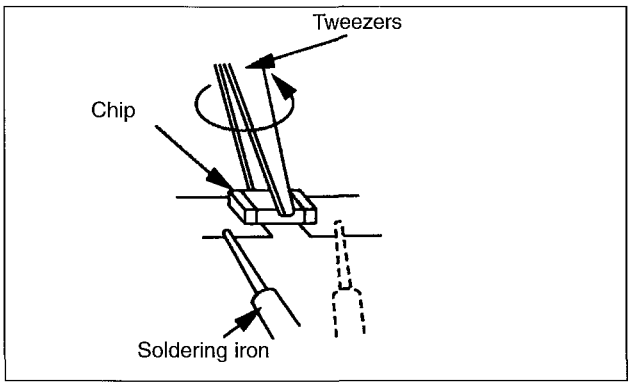


Fig. 2-1

3. Installation of leadless components

a. Presolder the contact points on the circuit board.

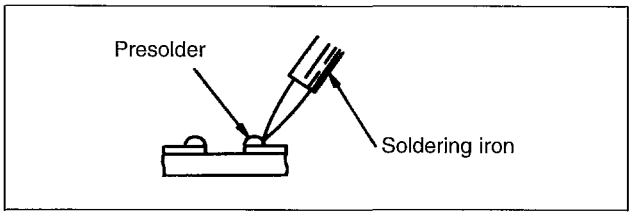


Fig 2-2

b. Using tweezers press down the part and solder both electrodes as shown below

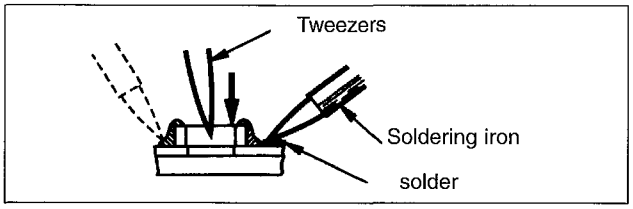


Fig 2-3

Note:
Do not glue the replacement component to the circuit board

How to remove/install the FLAT PACK IC

1. How to remove the Flat Pack IC

• Using a hot air Flat Pack IC unsoldering equipment

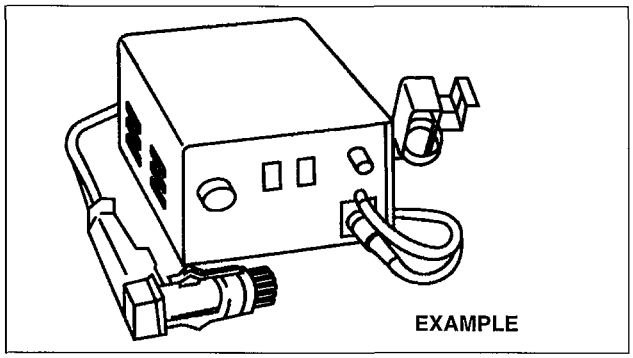


Fig. 2-4

a. Prepare the hot air Flat Pack IC unsoldering equipment. Then apply hot air to Flat Pack IC for 5 - 8 seconds

b. Remove the Flat Pack IC with tweezers while applying the hot air

CAUTION:
To avoid damage, do not apply the hot air to the chip parts around the Flat Pack IC for long periods

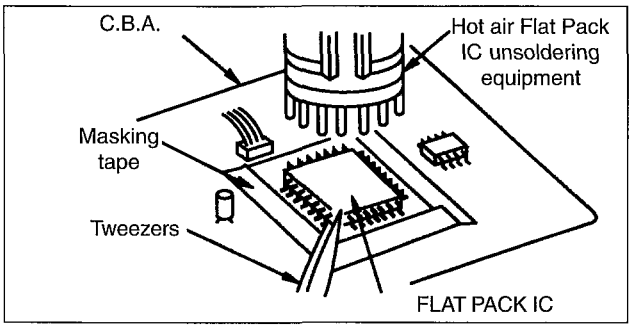


Fig 2-5

Put masking tape around the Flat Pack IC to protect adjacent parts.

2. The Flat Pack IC is fixed to the P.C.B. with glue; therefore take care not to break or damage any foil under the IC or on each pin when removing it

• *Using a soldering iron*

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC
Apply solder flux to all pins of the Flat Pack IC, to allow easy removal

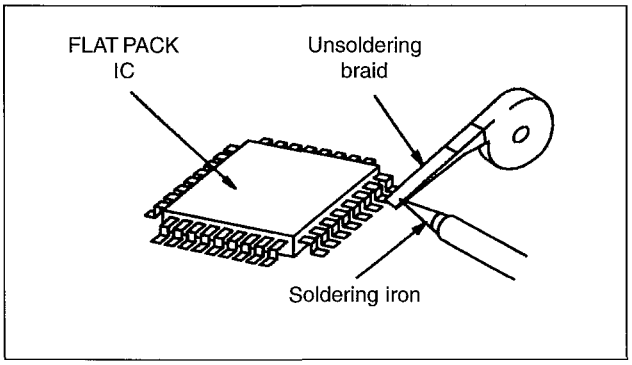


Fig. 2-6

b. Lift up each lead of the Flat Pack IC individually, using a sharp pin or non-solder wire (iron wire), while heating the pins using a fine tip soldering iron or a hot air blower.

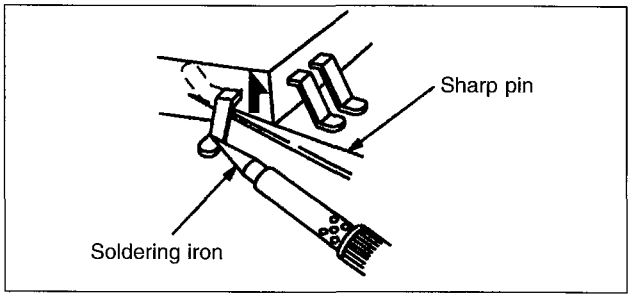


Fig 2-7

• *Using iron wire*

a. Use unsoldering braid to remove the solder from all pins of the Flat Pack IC Apply solder flux to all pins of the Flat Pack IC, to allow easy removal.

b. Affix the wire to workbench or solid mounting point (see Fig 2-8)

c. Pull up the wire as the solder melts in order to lift the IC lead from the P.C.B. contact pad, while heating the pins using a fine-tip soldering iron or hot air blower

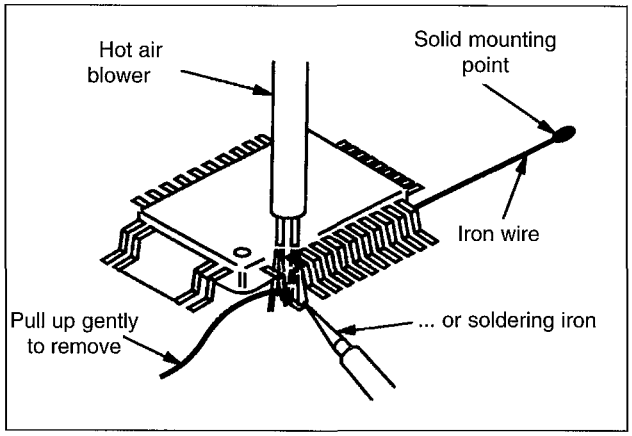


Fig 2-8

Note:
When using a soldering iron care must be taken to ensure that the Flat Pack IC is not held by glue or the P.C.B may be damaged if force is used.
If the IC is glued, heat the IC with hot air to loosen the glue.

2. How to install the FLAT PACK IC

a. Use unsoldering braid to remove the solder from the foil of each pin of the Flat Pack IC on the P.C.B in order to install the replacement Flat Pack IC more easily

b. The "•" mark on the Flat Pack IC indicates pin 1
Make sure this mark matches the 1 on the P.C.B. when positioning for installation. Then pre-solder the four corners of the Flat Pack IC (see Fig 2-9).

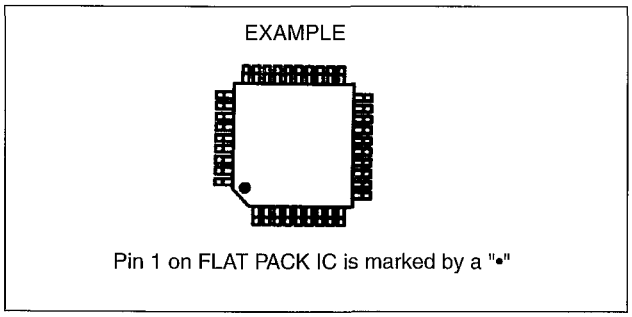


Fig 2-9

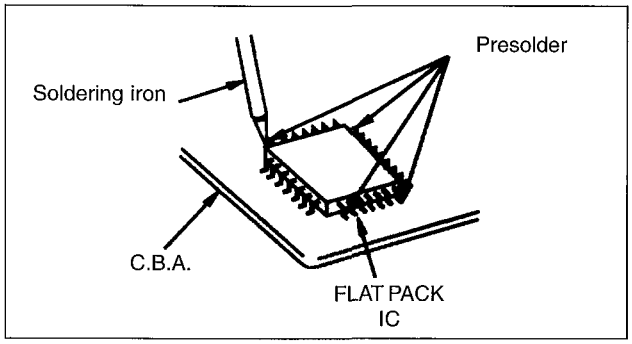


Fig. 2-10

c. Solder all pins of the Flat Pack IC Make sure that none of the pins have solder bridges between pins on the Flat Pack IC

Note

All integrated circuits and many other semiconductor devices are electrostatically sensitive and therefore require the special handling techniques described in the "SAFETY INSTRUCTIONS" section of this manual.

Voltage measurements

Color bar signal in SP REC and PB modes.

Note:
Voltage indications for the REC. and PB mode on the schematic diagrams are shown below:

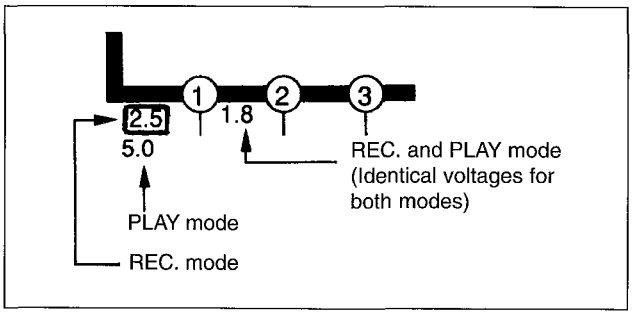


Fig 2-11

How to read wave forms

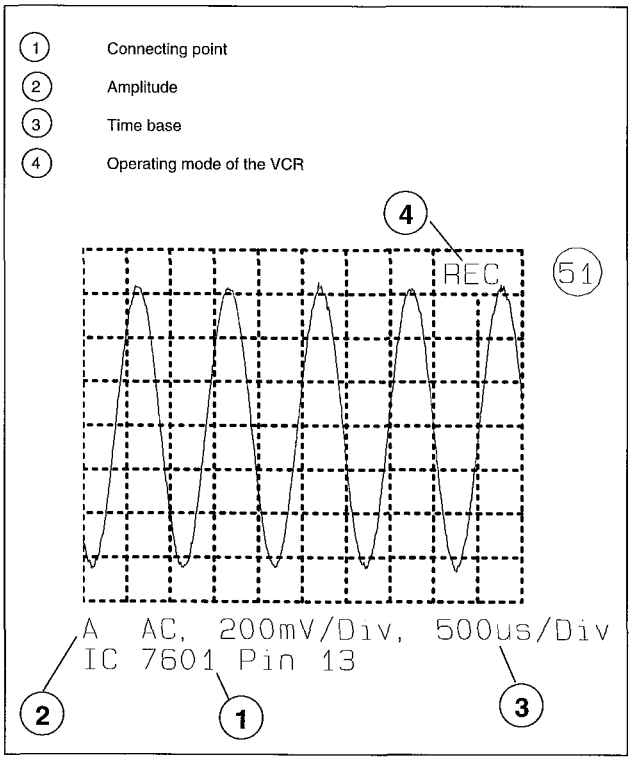


Fig 2-12

Voltage indication of Zener diodes

The Zener voltage of Zener diodes is indicated as such on schematic diagrams

Example:
BZX79C**20**. . Zener voltage 20 Volts

How to identify connectors on schematic diagrams

Each connector is labeled with a connector number and a pin number indicating to what component it is connected; in other words, its counterpart.

Use the Connecting Wiring Diagram to find the connections between associated connectors.

Example:
The connections between C.B.A.s are shown below·

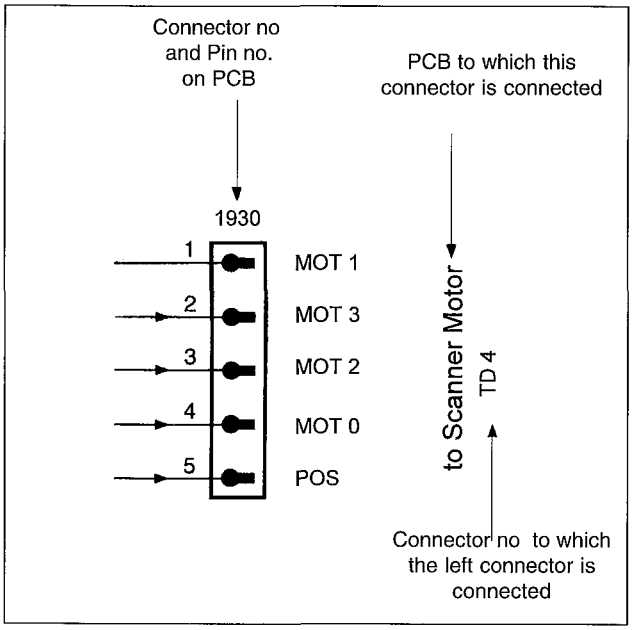


Fig. 2-13

Test point information

With this model, test pin or components leads are used as contact points for adjustment and checking In case of other test points with no test pin or components leads, use the foil solder pad to connect the measuring equipment.

Removal or installation of flat cables

a. Removal

Pull out the flat cable, holding it securely to avoid damaging individual wires (see fig 2-14).

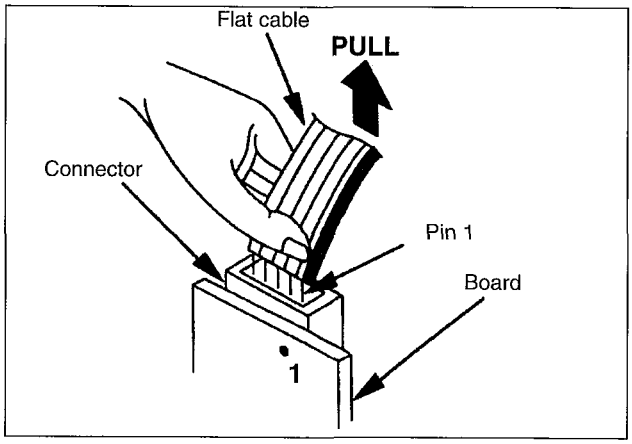


Fig 2-14

b. Installation

1. Adjust the position of the flat cable so that the lines on the flat cable align with the pins X of the trap connector (see fig 2-14)

2. Align individual wires with its individual trap connector hde. Then insert the flat cable wire into the trap connector.

   CAUTION: After installation, inspect the connection to insure that individual wires are not bent or touching other wires.

Dismantling instructions

General guidelines for dismantling housing components, electronic parts and the drive mechanism

Always disconnect from mains before dismantling or assembly.

Due to the supply voltages (hot circuit) on the primary side of the switched-mode power supply, an isolating transformer is required for the operation of the device.

The drive or the drive/motherboard unit must not be pulled out by the cross struts!

Components placed below the tape deck has to be inserted exactly.

The use of a regulating isolating transformer is recommended for detecting faults around the power supply.

All screws of the video recorder can be removed or tightened with a 10* torx screwdriver .

1. Housing cover (Fig. 1)

- Remove the four screws (A)
- Push catch (S) inwards, lifting lid at the same time to move out of groove
- Slide housing cover back by approx 1 cm
- Push centre of housing cover sides on underside approx 1 cm outwards and lift up the housing cover.

Assembly
Assemble in reverse order.

2. Base plate (Fig. 2)

The base plate may not be removed from the frame!

3. Front panel (Fig. 2)

Preparation
Dismantle the housing lid as described in section 1

- Position the device with the base plate facing upwards
- Undo the six catches (S) one after the other, starting from the left or the right
- Remove the front panel by pulling it forwards
- For devices with shuttle print or socket print, disconnect the cabling to the motherboard.

Assembly
Assemble in reverse order (device in operational position)

Important
- The lift flap lever should be connected to the lift flap guide
- Check that all catches are engaged

4. Dismantling of the motherboard/drive combination (Fig. 3) (Fig. 4)

Preparation
Remove the housing cover as described in section 1
Remove the front panel as described in section 3

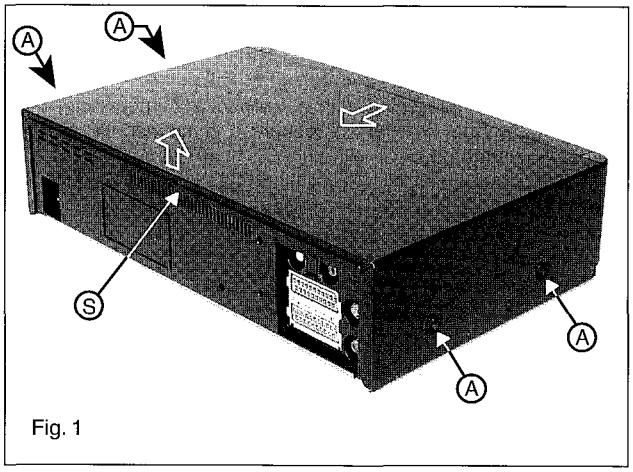


Fig. 1

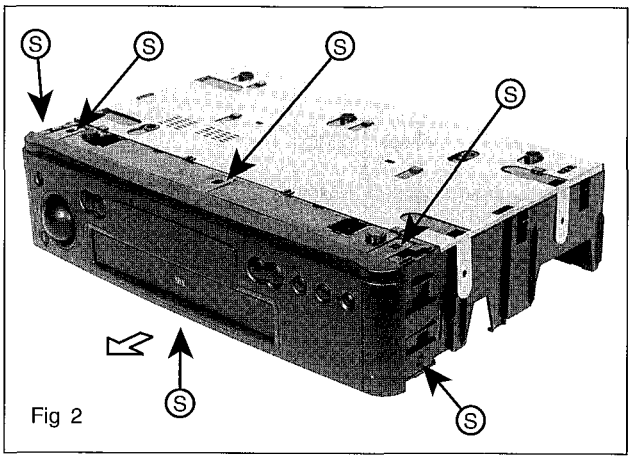
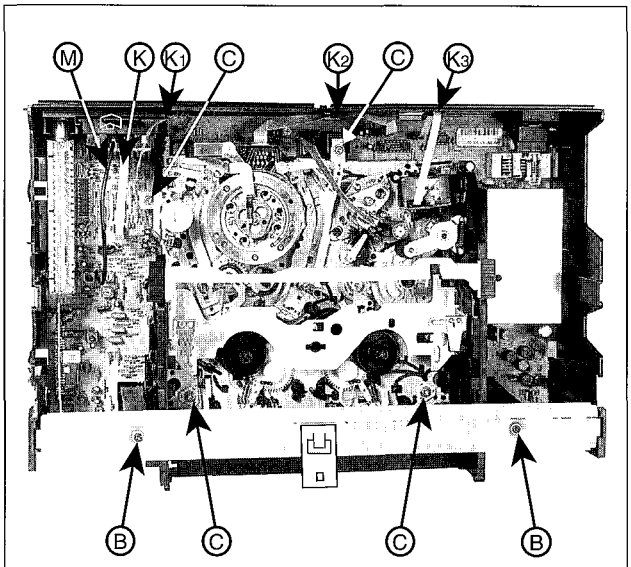


Fig 2



Lift protection

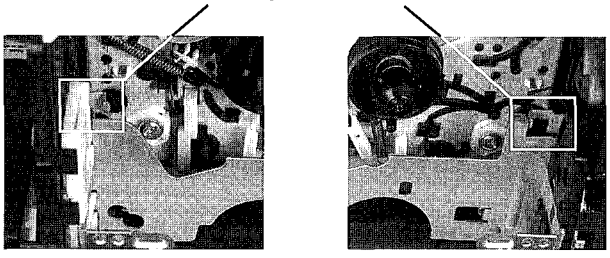


Fig 3

* .available from dealers

- Move device into operational position (Fig. 3).
- Undo the two screws (B) of the stay and pull it up to remove it
- Push back the lift by 5 cm after releasing both lift stops.
- Undo and remove the four fastening screws (C) of the drive
- Detach the Cinch socket cable (K) and ground cable (M) from the socket print (if present)
- Remove the cables (K1; K2; K3) from the guides on the rear of the frame
- Pull the Cinch socket holder with the socket and print up and out of the frame (if present)
- Position the device with the base plate facing up.
- Undo the 10 catches (S) from the rear right to the rear front and then from the rear left to the front left
- After the weight of the motherboard/drive unit has released it from the frame, the catch (S) at the mains socket has to be released for a second time
- The frame can be removed by lifting it off
- Turn the motherboard/drive unit and move it into the service position (Fig 5), if necessary
  The device is operational in this position
  "Eject" must NOT be used !!!

Caution:

Adjustments can not be made in the service position
"Eject" must NOT be used !!!

Assembly

- Position the frame with the top open onto a level surface
- Hold the drive on the side at the lift and insert the motherboard/ drive unit into the frame, pushing it down lightly Observe that the power supply and Scart sockets are positioned in openings.
- Check that all 10 catches (S) are engaged
- Secure the drive with the four holding screws (C)
- Move the lift into the "Eject" position
- Push the stay onto the frame with the chamfered side facing to the rear and secure with both screws (B)
- Insert the Cinch socket into the opening and ensure that it engages.
- Connect the Cinch socket and the ground cable (K , M) (if present)
- **Insert the cables (K1; K2; K3) into the supports provided in the frame.**
- Replace the front panel and the housing cover

5. Dismantling the drive (Fig. 3)(Fig. 5)(Fig. 6)

Preparation

Remove the housing cover as described in section 1
Remove the front panel as described in section 3

- Undo the two screws (B) of the stay and pull it up to remove it.
- Push back lift by 5 cm after releasing both lift stops
- Undo and remove the four fastening screws (C) of the drive.
- Undo and remove the ground screw (D) at the rear.
  (For this purpose, insert the screwdriver through the hole in the back panel)
- Remove the cables from the drive
- Bend back the guard of the scanner cable.
- Remove the scanner cable from the socket
- Return the lift into the "Eject" position
- Slightly lift the left rear side of the drive to undo the connector to the capstan motor.
- Press both catches (S) together with fine pliers and lift the drive around the snapholders
- The drive may be separated from the motherboard

Assembly

Assemble in reverse order.

Important

Observe that the cables (K1; K2; K3) are positioned in the supports on the rear of the frame and that the ground screw (D) is screwed in!

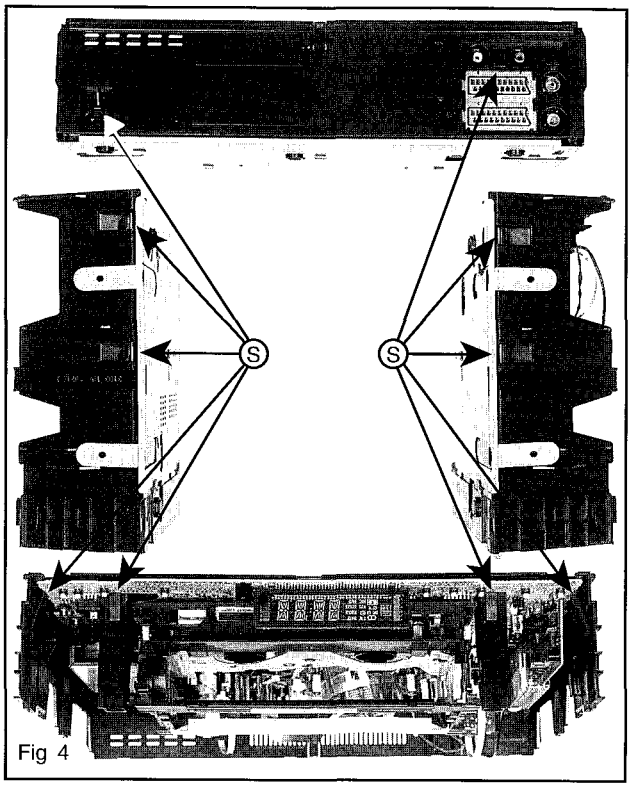


Fig 4

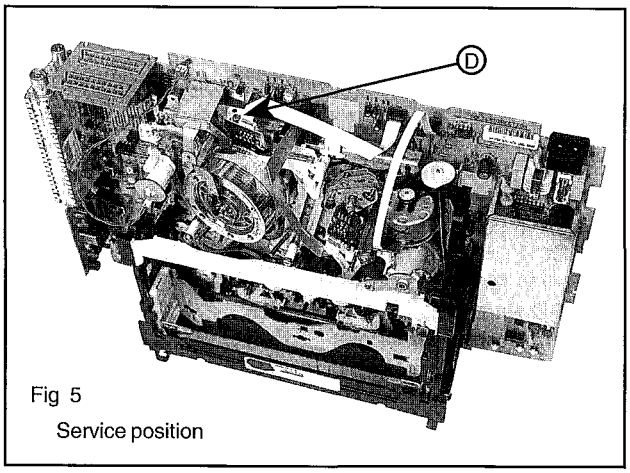


Fig 5
Service position

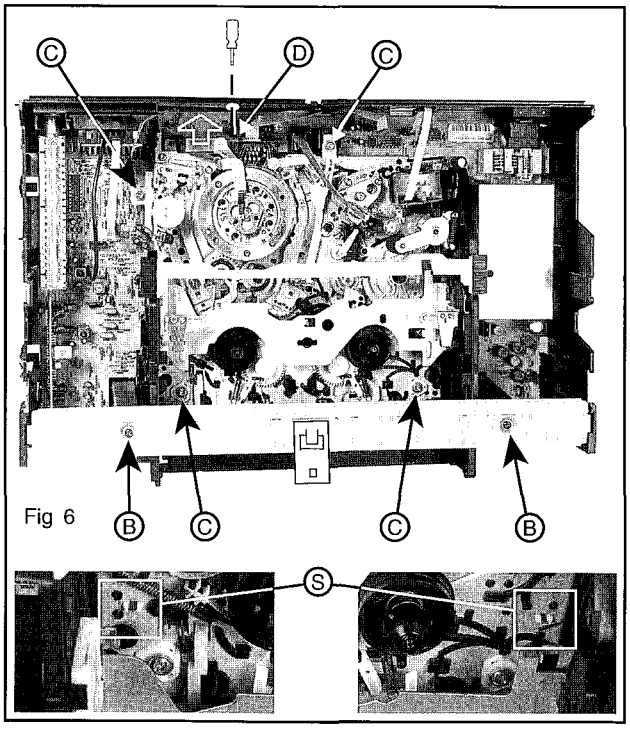


Fig 6

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1. Switched-mode power supply PS (PS - Part)

1.1 Technical data:

Mains voltage:	187-264 Vrms
Maximum output:	40W
Operating frequency:	100 kHz
Efficiency:	approx 80 % at max output

1.2 Functional principle (Blocking Oscillator principle):

During the conductive phase of the switching transistor, energy from the mains is transferred to the transformer This energy is released to the load during the blocking phase. The switch-on time regulates the energy transferred in each cycle in such a way that the output voltages are not affected by load or input voltage changes The integrated circuit [7354] controls the power transistor

1.3 Low power stand-by mode:

The 5VASW and the 12SW are switched off with ISTBY and the switched-mode power supply operates with a controlled low frequency of approx. 50 kHz to minimise switching losses
The power consumption is less than 6 W.

1.4 Reversal point:

At this point of the output characteristic, the maximum power is transferred

1.5 Overload:

The power supply operates in burst mode The energy in every cycle is limited, resulting in low output power **(Fig.1)**

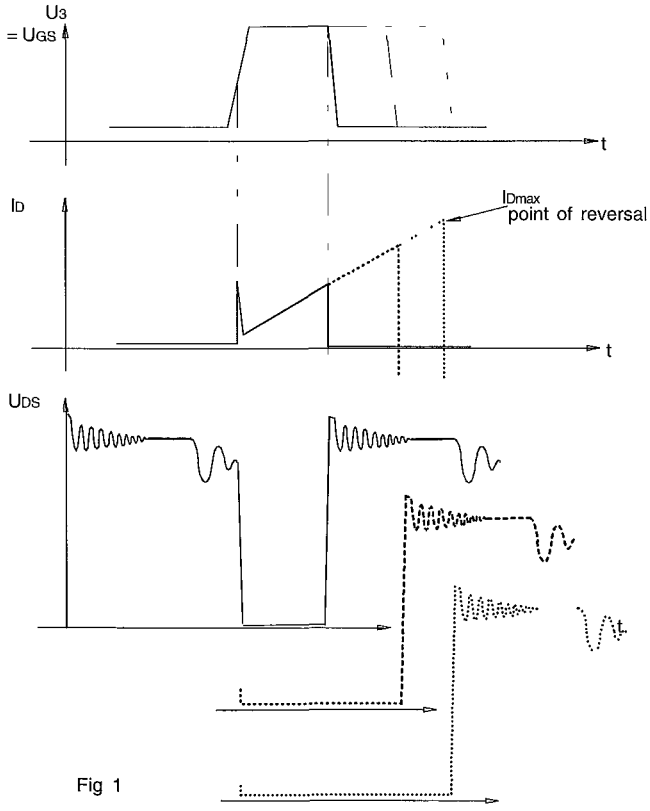


Fig 1

1.6 Circuit description:

A filter around spool [5352] protects the mains against any interferences generated in the power supply The mains voltage is rectified by the bridge rectifier [6360] and is filtered by the electrolytic capacitor [2362] The electrolytic capacitor [2361] charges itself from [3370, 3369] and supplies the IC [7354] during the start-up phase. The supply is then provided by the transformer winding 4-6 with diode [6350]. During the switch-on time of the switching transistor, current from the rectified mains voltage flows through the primary winding of the transformer, the transistor [7350] and the resistor [3363] to earth. As the positive voltage at point 7 of the transformer is constant (for this example), the current increases linearly and forms a ramp, depending on the mains voltage and inductivity of the primary winding A magnetic field representing a certain volume of energy is formed inside the transformer. The secondary voltages are polarised in such a way that the diodes block. A voltage image of the primary current is passed to pin 7 of the IC [7354] via resistors [3363,3359]. This is checked and, as soon as it reaches a certain value, depending on the control voltage at pin 14 of the IC, the transistor [7350] is switched off.
Once the switching transistor is switched off, no further energy is transmitted to the transformer The inductivity of the transformer now endeavours to maintain the current that has passed through it at a constant level (U=L*di/dt) The current reduces, however, di/dt becomes negative and the polarity of the voltages at the transformer reverses, resulting in a current which flows through the secondary winding of the transformers, the diodes, the electrolytic capacitors and the load This current, too, is ramp-shaped (but decreasing).
The switched-mode power supply is controlled by changing the conductive phase of the switching transistor so that either more or less energy from the mains is taken over into the transformer. The control information is provided by the control element [7352] This element compares the 5V with an internal 2 5V reference voltage The output voltage of [7352] is passed to pin 14 of IC [7354] via an optocoupler (for galvanic isolation). It compares the voltage to an internal reference value. The resulting value changes the level with which the voltage at pin 7 (image of primary current!) is compared The voltage at pin 5 of the IC [7354] is used for FOLD BACK in case of overloading The maximum available secondary power is determined by the resistor [3363] At a certain voltage (normally 1V) at pin 7 of the IC, the power supply enters the reversal point. The protective circuit at pin 11 is an option of the IC The start-up phase is carried out with shortened pulses by [2356] so that the operating frequency lies outside the audible range.
On the secondary side, six voltages are available, which are rectified by [6371, 6355, 6356, 6357, 6358, 6359]. The capstan motor voltage 9/14M2 (turbo) is changed over with control line CSW and transistor [7358]

1.7 Description of the start-up phase

After connection to the mains, the following voltages at the pins of IC [7354] **(Fig.2)** rise at time t_0 Vcc (pin 1) corresponding to the half-wave loading via resistors [3369, 3370] to $V_{ccstart}$. In this case, the current input is normally 0.3 mA The internal reference voltage V_{ref} of the IC is activated upon reaching $V_{ccstart}$ (approx 13V) The oscillator starts to oscillate. The frequency is determined with the capacitor at pin 10 (approx 100 kHz), which is charged/discharged via current sources The current take-up then rises up to 17 mA.

The voltage at pin 11 rises linearly (soft start) The IC starts with shortened pulses until pin 11 has reached a voltage of 2 4V.
If V_{cc} falls below the limit V_{dis2} before the reversal point is reached, or if Vcc rises to V_{ccprot} (normally 16V) (fault in the control loop), the start-up is stopped (pin 3 is switched off) and the IC (U_{ref}) is switched off V_{cc} increases in accordance with a half-wave loading, a new start-up cycle commences **(Fig. 2).**

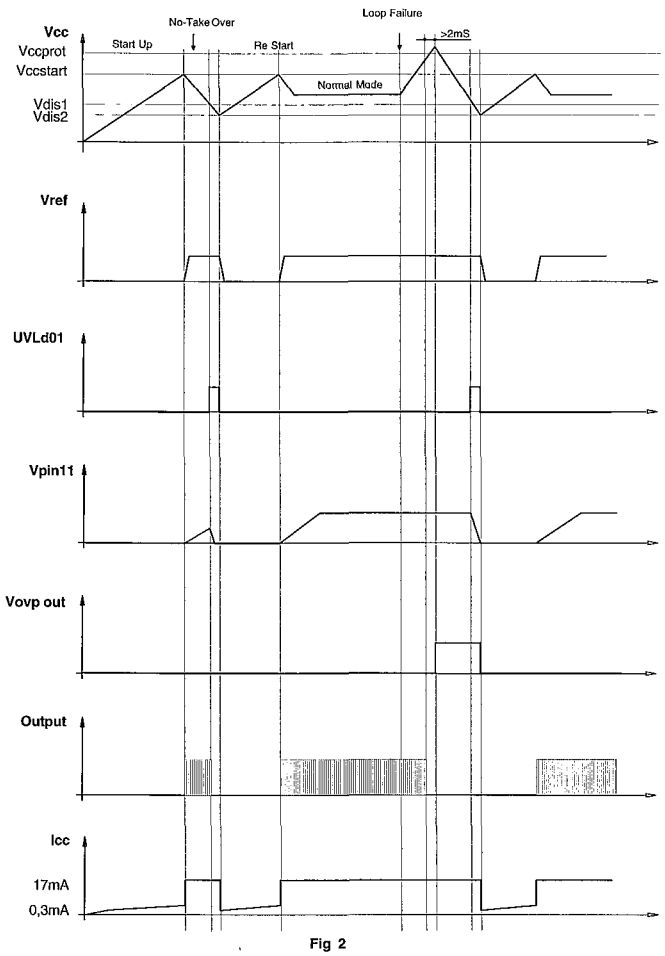


Fig 2

1.8 Normal operation, overload, standby

After the start-up, IC [7354] is inside the control range The voltage at pin 14 is normally 2,5V. If the load increases on the secondary side, the switch-on time is increased. The peak voltage value at pin 7 (drain current image) is also increased
If the load increases further, the overload amplifier of the IC (normally 1V at pin 7) starts to reduce the pulse width of U_3 (reversal point)
The IC supply V_{cc} behaves like the secondary voltages. Consequently, V_{cc} also decreases with increasing load. In the condition $V_{cc} < V_{dis1}$ (approx 9V), the IC changes to burst mode (query range) The short-circuit capacity is low because the interval between the half-wave start-ups is large.
In case of decreasing load, the switch-on time is shortened. If the load decreases further, the IC switches the frequency back to approx 50 kHz (standby mode) from a certain voltage threshold at pin 7 (depending on the protective circuits at pins 12,15) This keeps the switching losses at the transistor to a minimum

1.9 Overheating

The IC [7354] contains overheating protection, blocking the logic in case of excessive chip temperatures (normally 155 °C) Once the temperature has been reduced, a renewed start-up is possible

2. Deck electronics DE (DE-, DC - part)

2.1 General :

The TVC (Toshiba Video Controller) is a single-chip micro-controller with the following functions.

- 12k byte ROM (242)
- 16k byte ROM (642)
- 320 byte RAM
- 8-bit A/D converter
- 2 serial bus interface
- 2x12-bit PWM outputs
- 1x8-bit PWM output
- Composite sync input
- special aux inputs

The TVC contains two serial interfaces suitable for data exchange with other µPs The component is supplied in QFP (64 pin) or SDIP cases (64 pin).
8+4 analogue inputs are available. The resolution of the converter is 8 bit The max processable input voltage range is 0...5V (determined by the reference voltages AVSS and AVCC). Three analogue outputs are available, two with 12 bit and one with 8 bit resolution. The outputs supply a signal with a constant frequency (PWM8 approx. 20kHz, PWM1, PWM2 approx 39kHz) with a variable duty cycle.

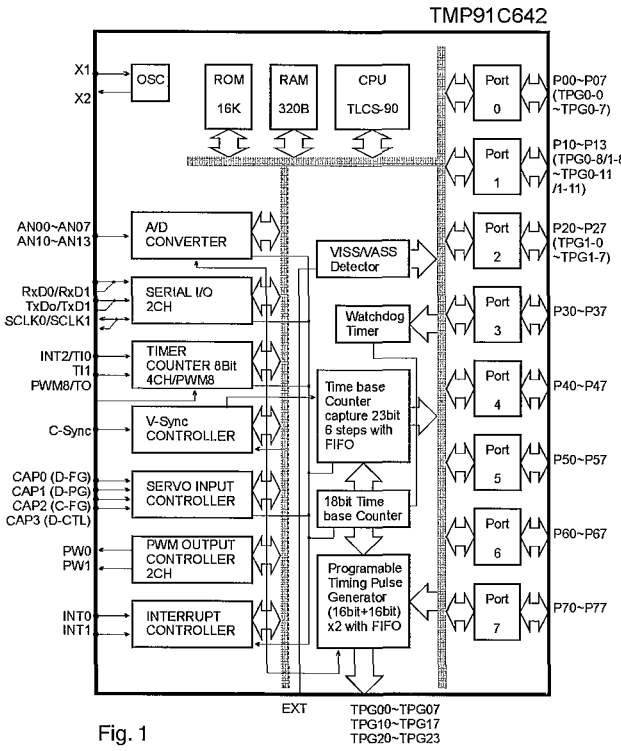


Fig. 1

2.2 SAA 1310 Interface DM - DE :

2.2.1 CTL stage

The IC SAA 1310 contains a read/write- stage for the CTL track with the option of overwriting an existing CTL track without any interference. The playback stage contains a 'digital' two-stage AGC. This switching logic detects the size of the output signal supplied by the CTL head via comparators and then selects the best amplification factor in the playback stage.
The CTL head voltage can therefore vary considerably if V_{max} / V_{min} is >> The LP mode has the slowest tape speed The fastest speed is achieved during FAST WIND or FAST SEARCH. To ensure that the duty cycle of the tape sync is always correctly reproduced under the previoulsy-mentioned conditions (important for the detection of VISS markings), the amplifier may not be overdriven

The two-stage AGC cannot process the large dynamic range of the input voltage on its own Consequently, the amplifier contains an additional low pass characteristic (normally fg = 3kHz) (internal) Furthermore, the transistor [7469] is used to further reduce the amplification for all WIND modes
In this case, the signal IWIND is low and T7469 is blocked. The transistor is purposely inversely polarised, as the inverse operation has better attenuation characteristics for this application If T7469 is blocked, the amplification is mainly determined by the internal negative feedback resistors of the SAA 1310, [7460] and the external resistor pos 3488 By short-circuiting R3488 with T7469, the amplification can be reduced in the following ratio
Von / Voff = 1 + R3488 / 100.
The RC element comprising capacitor pos 2464 and resistor pos 3489 is connected in parallel to the CTL head Together with the CTL head inductivity, the capacitor causes an increased resonance at approx. 10 kHz. This is attenuated by R3489 which causes an aperiodic transient response from the resonance Beyond the resonance frequency, the frequency transfer characteristic shows a steep drop This achieves an effective suppression of high-frequency interference The CTL head signal amplitude during SP is approx 1mVp (normal).
Consequently, the amplification of the playback amplifier must be correspondingly high. To avoid offset problems, a 47 µF electrolytic capacitor [2463] is installed in the negative feedback branch for DC decoupling
The polarity of the playback amplifier can be switched with the Video - Index - Search - System (VISS) voltage Only in this way can the TVC write a VISS marking without spikes onto the tape. The signal Write/Read (W/R) is used to switch between recording and playback.
Write : High
Read Low

2.2.2 POR (Power On Reset) - Generator :

The POR generator contained in the SAA1310 [7460] only requires an external capacitor [2467], which determines the length of the POR pulse.
With a 33 nF, t_{POR} is approx 30 msec The response threshold of the reset circuit lies between 4.5 and 4 8 V. Supply fluctuations that are shorter than $t_{POR}/100$ and do not fall below 3 5 V, do not activate a POR.

2.2.3 The sensor interface :

The four comparators in the SAA 1310 [7460] are used for the conversion of sensor signals onto logic levels Two of these comparators contain open-collector outputs (pin 11 and 13), which can switch a current of 100 mA. The outputs are overload-protected by current limiting and thermal overload protection. Only the non-inverted input of every comparator is externally accessible. The other inputs lie on the internal reference of a nominal 2.5 V The fixed hysteresis of the comparators of approx 10 mV is also located internally

The comparators are connected as follows :

Comparator 1 : In = FTA, pin 5; Out = FTAD, pin 15·
FTA = Threading tachometer This signal is generated by the butterfly photoelectric barrier in the deck An infrared beam is interrupted by a 4-section butterfly unit For a correct evaluation, the output amplitude of the photoelectric barrier must fluctuate at least between the voltage levels 1.5 V and 3 5 V An additional hysteresis is created with resistor [3492]

Comparator 2 : In = WTR, pin 6; Out = WTRD, pin 14 :
WTR = Winding tachometer right, from a reflection photoelectric barrier The same applies for the levels as with the FTA

Comparator 3 : In = WTL, pin 7, Out = WTLD, pin 13
WTL = Winding tachometer left, see above (not for BASIC)

Comparator 4 : In = FG, pin 8; Out = FGD, pin 11 :
FG = Capstan tachometer. This signal stems from an amplifier for the tachometer hall sensor on the motor unit The output impedance is 10 kΩ. The amplitude of the near sinusoidal signal is normally 1 Vp It may not fall below 300 mVpp. It is AC coupled via a capacitor [2468] In order for a bias current to flow, the input pin 8 must be passed via a resistor [3491] to the reference voltage at pin 3 A capacitor [2465] for filtering out high-frequency interference is arranged in parallel to the bias resistor

2.3 Interface to the head-drum motor driver:

The head-drum motor driver IC TDA5241 contains a fully integrated 'start-up' circuit.
The connection of the HMO driver TDA5241 [7300] between the motherboard print and the head-drum motor is provided by a connector pos.1930.

- REEL is the Speed-Phase control signal.
  The resolution is 14 bit.

- PG/FG is the combined Speed-Position signal of the TDA5241

The current input of the +14M1 is 70mA (normal) at room temperature During acceleration of the motor, approx 0.5A may flow for a short period

2.4 Capstan motor interface:

The driver IC of the capstan motor is activated via connector 1946.
CAP is the CAPstan speed control signal, which varies without load between 0 and 5V
The rotational direction of the motor is determined with CREV (capstan reverse) The maximum current input of the motor is limited to 1A. Typical values in PLAY mode are 0 2 0.3 A

2.5 Loading motor driver :

The TMO driver uses a bridged dual-power opamp L2722 The IC can supply +/-1 A output current. It contains short-circuit and thermal overload protection and integrated flyback diodes at the outputs The output current is limited by the internal resistance of the pin-wound motor (normally 18 Ohm) to approx 0.7 A (start-up or motor is blocked)
Between the IC outputs (pin 1 and 3), a Boucherot element (1 5Ω, 100 nF) is arranged to suppress a 3 MHz-oscillating tendency at the output stage One half of the bridge is controlled via the TMO line and functions as a comparator The other half is an amplifier-integrator with a gain of 3 9 A change of the input voltage (THIO) between 0 and 5 V results in a voltage variation of between 0 V and nearly Ub at the output With a 50% modulation (THIO = 2,5 V), pin 3 has approx. 7 V The capacitor in the negative-feedback of the opamp filters out the PWM frequency of approx 21.5kHz. During a Power On Reset (POR), the TVC sets the THIO line to Low whereas TMO is set to High. In order to ensure that no current flows in the motor during the POR pulse, the aforementioned polarity must be maintained. This prevents the motor's destruction in case of prolonged triggering or blockage This circuit, however, also has the disadvantage that, if the 5V fails (e.g. blown fuse pos1402), residual voltages may be passed to the IC inputs via the 14V These residual voltages trigger the comparator and the amplifier in opposite ways, causing a short-circut of the loading-motor's coil In order to avoid this, a separate reference voltage divider [3445,3446] is used for the comparator section Both outputs of the L2722 [7440] are then in common mode, therefore protecting the motor

2.6 Analogue interface to the TVC :

The following analogue levels are supplied to the TVC's internal A/D converter:

- TRIV Tracking Information Video
- TAE/TAS Tape End/ Tape Start Detection
- I/R Logic Information from INIT and Record protection
- AGC Automatic Gain Control

2.7 Tape end - LED control :

The LED current is controlled with the transistor pos 7463 The ON time is approx 1 msec with an ON/OFF ratio of 0 09.
The LED current is normally 180 mA. In order to prevent interference from the relatively high pulsed current 'spreading' through the entire unit, the LED is fed from the +14M1, and filtered by 2 NFR´s [3414, 3415] with 10R each and a 220µF electrolytic capacitor [2459]

2.8 Evaluation of the drive switch:

The drive contains two switches :

- INIT Initialisation switch
- RECP Record protection

The conditions of these two switches can be passed into one of the analogue inputs of the TVC with a single line (I/R). For this purpose, all switch outputs whose levels could be either "H" (5V) or "L" (0 V) are connected to one another via a resistance weighting network Each possible switch condition combination therefore has a corresponding direct voltage at the I/R line.

2.9 Test picture generation:

The test picture generation (sync, black and white) is carried out with the resistor network [3430, 3431, 3437 and 3471] and is fed into the signal electronics IC [7007].

2.10 Version definition :

Various ROM masks are used. All relevant settings are stored in the EE-PROM in the form of option bytes

2.11 EE-PROM :

An EE-PROM is an electrically erasable and writable, non-volatile ROM (information remains if operating voltage fails). The R/W cycle is carried out via the serial bus SDA, SCL It is now possible to store, unit or deck-specific parameters such as X distance, gap position, tuning limits and possibly also differences between TAE and TAS, left - right tolerance of the tape end photoelectric barriers (previously paired photo-transistors were used) in the EE-PROM
The adjustment of the gap position is carried out automatically in the service test programme with the aid of a test cassette The preset stations and some options are also stored in the EE-PROM.

2.12 CMT detection :

This was extended due to identification problems caused by weak transmission signals and NON-STANDARD video signals. The CSYNC line is offered to the TVC on pin 6 A hardware integration of the picture pulse compensates the perturbations generated by the "strong" channels on the "weak" channels

3. Operating unit DC (DE-, DC - Part)

The front controller [7201] is the core element of the operating unit, fulfilling the following tasks with the respective function groups.

- Shuttle evaluation
- Evaluation of keyboard matrix
- Decoding of remote control commands from the infrared receiver pos 7203
- Quartz timer
- OSD
- Integrated RAM for storing timer data
- Activation of the display
- Bi-directional serial interface for data exchange between the front controller and the deck µP (CLKD1 port P32, DATD1 port P34, DATD2 port P33)
- I2C bus interface (SDA port P50, SCL port P36) to TUMOD [1701], VPS/PDC decoder [7540] and EEPROM [7890] on the motherboard

The drifting of the tuner or the aerial signal generates the control voltage AFC in the receiving circuit element (FV) on the motherboard. This voltage is passed to port P53 and the front controller readjusts the tuner tuning voltage.

In case of a power failure, the back-up cell supplies the timer and the RAM via pin 33 for 30 minutes or 7 hours, depending on the model [2997, 220mF gold capacity]. A diode [6299] prevents the back-up cell from discharging. During this time, pin 2 is at LOW level, so that further functions of the IC are switched off by the quartz [1298] at pin 13 / 14

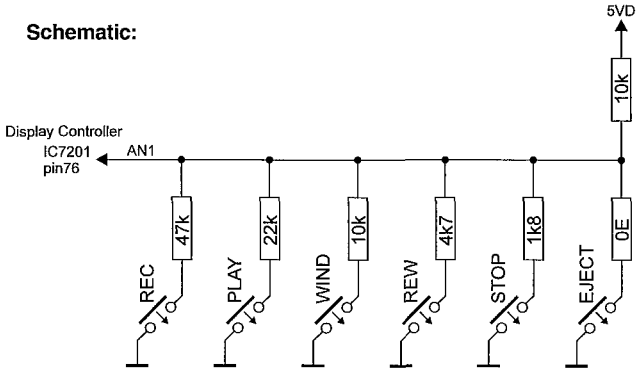
3.1 Shuttle:

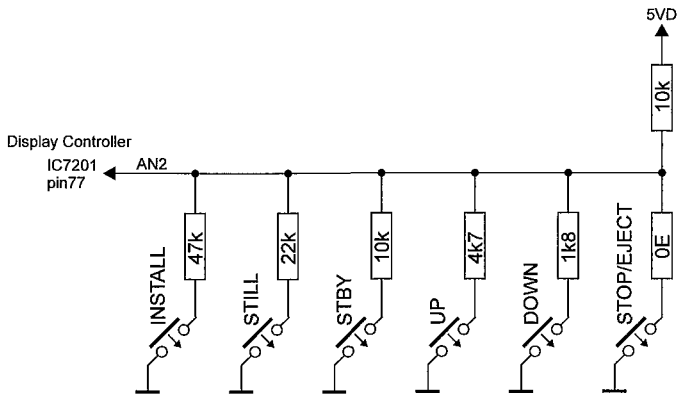
The shuttle EVQ WLG 001, which is electrically connected to the Print QMB1 via connector 1945 represents a binary coded rotary switch with a rotation angle of +/- 70 degrees and 16 switching positions A spring returns it to its centre position once released From this position, it can be moved in both directions by 7 or 8 switching positions All switching conditions are realised by the various electrical connections of the four different shuttle outputs B1 - B4 with a voltage of 5VD (level lift 0V/5V) These shuttle signals are read and evaluated at the input ports P01, P03, P04, P05 of the front controller. A shuttle function is only possible in the NORMAL operating mode.

3.2 Evaluation of keyboard matrix:

There are 12 different keys which are decoded by 2 ports (P51, P52) via 6 assigned DC values each Each mechanical key position at the print can adopt any key function via 2 coding resistors. The simultaneous pressing of keys may lead to an undesired function Critical functions such as RECORD and INSTALL cannot be accidentally activated by simultaneously pressing several keys

Schematic:





3.3 IR receiver and signal evaluation

The IR receiver [7203], which is only operational if the voltage 5VD is present, contains a selectively controlled amplifier and a photo-diode The photo-diode changes the received radiation (approx 940nm) into electrical pulses which are then amplified and demodulated At the output of the IR receiver [7203], a pulse sequence (level lift 0V/5V) corresponding to the envelope curve of the IR remote control command to be received can be measured This pulse sequence is read into the front controller via the interrupt input P30/INT3 for further signal evaluation

3.4 Generating the clock pulse:

In the operating modes NORMAL, LOW POWER, STANDBY and POWER OFF, the front controller and the sub-oscillator [1297] generate the clock pulse as the basis for the internal clock and date function. At port P22/XTOUT, a sinusoidal oscillation of 32 768kHz with a level of approx >3 Vss can be measured with a 10:1 probe. With the backup capacitor fully charged [2297], the backup time is 7 hrs

3.5 OSD:

The front controller activates the OSD-IC (LC74781 [7800]) via 3 lines (OCLOCK P35, ODAT P37, OCS P20)

3.6 Activation and function of the VFD display:

In principle, the VFD display [7202] is a tube triode in which the heating filaments serve as cathodes (F1,F2). The activation of the 7 VFD grid (G1 - G7) is carried out via P71 - P77 of the front controller, and that of the 16 anodes (P1 - P16) via ports P80 - P87 and P90 - P97 of the front controller, each with a positive potential compared to the cathode

The grids and anodes (digits and symbols to be displayed) are activated in the time-multiplex procedure (duty 1:16, scanning period 3 9 ms (16 x 244,14 µs), voltage lift 5V/-28V) A dimmer function is achieved by pulse-width modulation of the grid-activation signals In case of maximum display brightness, the pulse-width for each grid is 214 µs With the help of software, this can be reduced in several stages to 30 µs, which visually reduces the brightness of the VFD display

A digit or symbol is only illuminated if the corresponding anode and the surrounding grid are switched simultaneously to 5V for a certain period within a scanning period. The electrons emitted from the cathode are accelerated by the positively charged grid and hit the luminous layer of the anode which is also positively charged

During the remainder of the scanning period the corresponding grid and parts of the anode are at -28V, due to the internal pull-down resistors. This potential is lower than the average cathode potential of approx -16V, prevents the acceleration of electrons, thus causing the relevant grid and anode segments to go dark.

The direct heating voltage of the display (U = 6 5V) is supplied from the power supply to pins F1 and F2 of the VFD display via lines HELO or HEHI and via limiting resistors [3253,3254] The Z diode [6070] clamps the heating voltage to approx -16V via resistor [3074]. The heating voltage measured between pins F1 and F2 is normally +3 5V_{DC}

4. VPS/PDC-, OSD-, Follow me - Part

4.1 VPS :

The VPS-IC SDA5642-6 [7540] reads the data sent by the station from line 16 of the video signal (VREC) and issues the information required for the timer start to the front controller. In addition, data such as station name, country recognition, etc , are passed on to the µP

4.2 PDC/VPS:

The VPS/PDC decoder IC SDA5650 [7540] reads the VPS and also the PDC data from the vertical blanking gap and provides these to the front controller via the IIC bus

In addition, the time can be read out from the TXT header line (necessary for 'time download').

The date is not queried from the TXT header but via the PDC format 1 (different writing versions of the stations).

4.2.1 The following modes (data formats) are available:

- VPS (Timer data and station name)
- PDC Format 2 (Timer data and station name)
- PDC Format 1 (Station name and date)
- TXT Header line (Time for 'time download')

4.3 Follow Me - Part:

The video signals from the internal frontend of the VCR (VFV) and the VBS signal, which, when compared, corresponds to the TV frontend video signal connected to the Scart1-Input (VIN1), are 'digitalised' via comparators and are then compared. A low at the output of the circuit shows that the picture contents of both video signals are identical and it must consequently be the same station.

4.4 OSD-Part:

The front controller controls the OSD-IC LC74781 [7800] via 3 lines (Clock. OCLK, Data: ODAT; Select: OCS). The video signal VSB is passed from the signal electronics to the input of the OSD-IC [7800 pin 15] At the same time, the CSYNC is offered to the IC via an inverter [7801] for synchronisation.

From the video output of the OSD-IC pin 13, the signal passes to the I/O part In the case of Secam signal entries, the front controller activates a bypass between the video-in and video-out via the OSD-IC [7810, 5810, 2810].

With the aid of a LC oscillator [5800, 2800,2801], the IC generates its internal reference for the entry time, character size, etc From the TVC (Deck-µP), a frame pulse (OFP) is supplied for vertical synchronisation and is passed to pin 20 of the IC.

To generate a coloured background in case of a full page (i e blue back) or for internal command processing (OSD system clock), the colour sub-carrier frequency from the signal electronic is doubled (2Fsc· 8 86 MHz) and applied to pin 2 of the OSD-IC.

For units without OSD, the signal electronic (VSB) switches the video signal directly via the resistor [3805] to the I/O part (VOUT). During full page OSD, the video signal (VSB) is muted via the FFP pulse to improve the crosstalk attenuation.

5. Frontend FV (FV - Part)

5.1 The frontend consists of the following elements :

- TUMOD = Tuner + modulator
- IF amplifier & video demodulator IC TDA 9800 incl FM demodulator
- IF amplifier & video demodulator IC TDA 9812, 9813,9814 incl FM and AM demodulator
- FM stereo decoder TDA 9840
- NICAM decoder

5.2 The frontend was designed for the reception of the following systems:

- PAL B/G with FM stereo
- PAL I or PAL BG with NICAM stereo
- PAL BG with NICAM and FM stereo
- PAL BG/I SECAM L/L´ with NICAM and FM stereo
- PAL BG SECAM DK with FM stereo

- PAL B/G =/01,/02/03/11/13/16
- PAL I =/05 Pal I with UHF reception
- PAL I Ireland =/07 Pal I with VHF/UHF reception
- SECAM L,L', PAL BG/I =/39
- PAL B/G, SECAM DK =/59

All frontend variations are according to the norm EN 55020

The individual components are listed in the respective version of the circuit diagram

5.3 Tuner modulator (TUMOD)

The tuner and modulator are fitted in the same housing.
Both the tuner and the modulator are PLL controlled. The reception frequency or modulation frequency is set with the IIC bus.
The amplification is determined by the AGC voltage at pin 5 [1701] (for operation, see AGC section)

5.4 IF selection

The IF frequency of the picture carrier is 38.9 MHz for all systems with the exception of SECAM L´ (33.9MHz).
For PAL BG-SECAM DK and PAL BG/I-SECAM L/L´, a quasi-split-sound system is used, i.e separate surface wave filters (SWF) [1719, 1720] are required for the picture and sound carrier For all other standards, an intercarrier system is used; i e a mutual SWF incl. sound carrier attenuation [1721 for TDA 9800 or 1720 for TDA 9813] can be used for the picture and sound carrier.
The used sound SWF (K9456M and K9460M) have two different filter characteristics which can be switched.
For the PAL BG/I-SECAM L/L model, an additional circuit for suppressing the adjacent channel sound carrier is provided, which is set with the coil [5721] to maximum suppression at 40 4MHz.

5.5 IF demodulator

5.5.1 TDA 9800T

The output signal of the SWF is initially amplified and then synchronously demodulated. The carrier required for this purpose is regenerated from the input signal via a PLL The integrated VCO oscillates at double the picture carrier frequency (77 8MHz) and this frequency is internally divided. The loop filter for the PLL is connected to pin 6 The offset current of the phase comparator is compensated with a potentiometer [3748] (tuning to max. audio S/N) to achieve the best possible demodulation At pin 15, an AFC (**A**utomatic **F**requency **C**ontrol) voltage is available, which is evaluated for station tuning.

At pin 13, a demodulated video signal and the sound carriers at 6.0MHz and 5.5MHz (FM sound) or at 6.552MHz or 5 85MHz (see NICAM sound) are available. After a 6 0MHz or 5 5MHz sound trap, the video signal passes to an internal 6dB buffer (pin 14) A voltage divider and an emitter follower for level adaptation (1Vpp) are arranged at the output of the buffer (pin 7).
An additional widening of the sound trap consisting of pos 5741, 2793, and 3987, suppresses the second FM or NICAM sound carrier in the video for intercarrier or multi-standard models.

The FM sound carrier passes from pin 13 to output pin 9 of the internal FM PLL demodulator via a 6.0MHz or 5 5MHz sound filter
An external transistor amplifier provides the FM deemphasis and the level adaptation in two Scart models (500mVeff at 27kHz lift, 1kHz audio)

5.5.2 TDA 9813T

The TDA9813T is selectively operated in QSS and intercarrier (PAL BG only, pin 28 to earth) For the IF signal processing of picture and sound, separate internal elements are available
For video input stage, see TDA9800T This IC does not require the setting of the phase offset. The loop filter is connected to pin 5 The AFC is available at pin 20. As with the TDA9800T, the video branch is analogue, the second sound trap is not required
The IC contains an output for the sound carrier at 5 5MHz (6.5MHz) and 5 74MHz (6.258MHz). These are connected to the FM demodulators via filters (pin 14, 15) The audio signals are passed to the stereo decoder TDA9840T for stereo decoding (see below).
For NICAM, a second IF is passed to the QNIC subprint via a jumper
In the BG/DK stereo model, the second sound IF is selectively passed to the sound filter pair 5 5/5 74 MHz or 6.5/6 25 MHz via a HEF IC [7722]

5.5.3 TDA 9814T

This IC is operated exclusively in QSS In addition to the TDA 9813, it also contains an AM demodulator for Sec L, L'. The second sound IF is selectively passed to the sound filter pair for FM stereo 5.5/5 74 MHz or 6 5/6 25 MHz for PAL I reception via a HEF IC [7722]

5.5.4 AGC

The two-stage AGC is the same for all ICs. For small signals, the control is only carried out in the IF IC whilst the tuner operates with maximum amplification From a certain take over point, the IF IC issues a control signal for the tuner From this input voltage onwards, the control is basically only carried out by the tuner. The take over point is set with the potentiometer AGC-Adj [3742] to the best sensitivity and input interference immunity
The IF AGC voltage is supplied to the deck microprocessor via transistor [7724], which passes the information to the front controller via the signal level.
This is used to determine the sequence of the programs to be stored in autostore mode

5.5.5 FM stereo decoder TDA 9840T

For FM stereo, the signals L+R or 2R are transmitted by the sound carriers To arrive at the L and R signals, a decoding circuit is required. This computing circuit is implemented in the TDA9840T.
The input attenuators can be set with the IIC bus and serve for adjustment of the level and for setting the channel separation.
The frequencies containing the stereo recognition or dual tone recognition are filtered out via a LC network. For dual tone or MONO, the aforementioned computing circuit is deactivated
The deemphasis is carried out internally by the capacitors [2789 and 2790]
In the NICAM and FM stereo models, the output signals of the NICAM part are passed to the output selection switch of the TDA9840T (pin 9,10) and the audio signal is selected in the TDA9840T (outputs pin 13,14) via the IIC bus with the aid of software

6. NICAM decoder SAA 7284ZP - QNIC

The IC SAA7284 is a NICAM decoder which does not require any adjustment. It is realised on the QNIC subprint
The NICAM signal is filtered out by internal filters and is converted into the basic band. The signal is then demodulated and decoded. The digitised audio signal is converted into an analogue signal via a D/A converter.
In addition to the NICAM decoding, an audio switch is available (inputs pin 7,16) via which the internally or externally demodulated audio signal can be selected.
This switch is used to switch over to the FM audio or AM sound at SECAM L/L in case of incorrect NICAM decoding or a NICAM carrier not being available
Two low passes with an amplification of approx. 6dB are connected to the output which remove the carrier rests from the audio signal

7. Video signal processing VS (VS-, IO-, AL - part)

7.1 Switching functions of the signal electronics IC LA71525:

The signal electronics IC LA71525 [7007] is activated at pins 63 and 64 of the deck uP via the I2C bus

REC/PB
via IIC bus
during RECORD pin 19 (REC HIGH OUT) goes to 5V

PAL/SECAM/MESECAM/NTSC
via IIC Bus
during NTSC playback, pin 43 goes to 5V

SP/LP/SLP
via IIC bus

VIDEO INPUT SELECTION SWITCH
the video at pins 28 (Scart) or 32 (frontend) can be selected and switched via the IIC bus

VIDEO ENTRY
at pin 33 (FFP), the artificial picture pulse for the playback features and the test picture for the device installation are entered.:

Loop-through	< 0,8V
Test picture	= 1.2 .. 3 3V
art picture pulse	> 3 7V

COLOUR VECTOR
the colour vector is influenced with the aid of pin 67 (CSCP).

normal	< 0,8V
LP features colour	=

7.2 Recording :

7.2.1 Luminance

The input signal (pin 28 = Scart , pin 32 = frontend) is switched in the IC [7007] and is available at pin 34 as VREC with 1Vss. It is passed to pin 35 via an electrolytic capacitor In the IC [7007], the video signal passes through an amplification control (time constant determined by C [2005]) After the AGC, the signal is passed to a clamping stage where it is attenuated by 6 dB and from which it is passed to a chroma separation 3 5 MHz low pass filter and to the vertical emphasis (out· pin 42, in pin 40) This emphasis consists of a 1H-CCD delay line in IC [7003] (in. pin 5, out: pin 7) and an emitter follower [7005] Next, the signal passes from pin 25 to pin 26 via another emitter follower [7002] The filter at the base of the emitter follower does not function in the REC mode due to the low resistance of the emitter follower The Y signal then passes through the detail enhancer, the non-linear emphasis, the linear emphasis (time constant via pin 23,24) and the white/dark clipping stage.
The signal generated thus then directly activates the FM modulator Before the FM signal leaves the IC at pin 18, it passes through a further low pass filter Then it is passed to the addition point (FMRV) with the chroma signal, via an external emitter follower [7006].

7.2.2 Chrominance PAL

The arriving video signal (pin 35) is separated from the chroma signal by a band pass filter (BPF1) and is then passed to an ACC stage. The ACC amplification stage controls the chroma amplitude for the subsequent stages (time constant via capacitor at pin 13) The chroma signal is then passed on by the main converter. The main converter mixes the 5.06MHz sub-carrier of the sub-converter with the 4 43 MHz chroma signal to the 627kHz chroma FM signal.
The sub-carrier is a mixed product consisting of 4 43MHz (the REC APC compares the quartz and burst frequency; time constant at pin 54) and (40+ 1/8) fh = 627kHz (generated by 321fh -VCO, time constant pin 49/51 and the phase rotation according to the VHS standard, control pin 66) Via a band pass filter and the colour killer stage, the converted chroma signal is passed to pin 14 of the IC from where it is directly added to the Y-FM signal via an adjustment regulator [3007]. The colour killer can either identify the incoming signal itself (PAL yes/no, PAL· Chroma signal out, SECAM L Chroma signal killed) or can be set to PAL or SECAM L via the I2C bus. Apart from being a reference frequency, the quartz oscillation (pin 56) serves for the chroma processing and also for the clock frequency generation of the CCD stage [7003, pin 10].

7.2.3 MESECAM

The signal path is nearly identical to that of the PAL system.

Differences to the PAL system:

- No phase rotation
- The filter characteristic of the chroma band passes becomes wider
- Free running quartz frequency
- The deck microprocessor [7400] generates the MESECAM control signal via the IIC bus

7.2.4 SECAM L

The FBAS signal (VREC) of the IC [7007] passes via the emitter follower [7101] to the cloche filter, which cancels the transmitter RF-preemphasis. In the Secam L- IC pin 29 [7110], the signal passes through a 15dB amplifier and a frequency divider. The latter generates the 1 1 MHz signal required for recording by frequency division (1 4) of the chroma signal. The signal is then passed to pin 21 containing the subsequent band pass filter The band pass filter attenuates the harmonics generated during the frequency division. At the same time, the chroma signal is blanked at this stage for the duration of the line synchronous pulse The signal then passes through a 10dB amplifier and is switched to pin 15 on an anticloche filter. This filter generates the FM preemphasis provided as standard for a Secam chroma signal This is then added to the luminance FM signal at the addition point (FMRV) as a CSR signal.

7.3 Playback :

7.3.1 Luminance

The FM playback signal is passed from the head amplifier [7150] as a FMPV to the signal electronics [7007], pin 15 In the IC [7007], the level of the envelope curve is regulated before being filtered in the FM processing. At pin 17, the signal leaves the IC, passes via a phase shifter and a transistor stage for adapting the filter characteristic and then re-enters the IC [7007] at pin 20 The FM signal limited with a double limiter is demodulated and filtered with a low pass filter The demodulated Y signal still contains the preemphasis from the recording This now removes the linear deemphasis at the base of the emitter follower [7002]
The filter circuit is effective, as pin 25 becomes an open-collector output during the playback mode, whose load impedance is determined by the deemphasis circuit A peaking stage lifts the frequencies by approx 2 MHz (time constant pin 22).
The Y signal is then clamped, filtered with a low pass and passed through the vertical noise canceller or dropout compensator For this purpose, the Y signal leaves the IC [7007] (out· pin 42, in. pin 40) and is delayed by 1H in IC [7003]. The CCD-1H-delay line functions for the Y signal as a comb filter (vertical noise suppression) and as a line store for the dropout compensation.
Subsequent switching stages. non-linear deemphasis, horizontal noise canceller and the picture control circuit for sharpness Then the chroma signal is added to the luminance signal and is output as the FBAS signal (pin 38)

7.3.2 Chroma PAL

At pin 15, the FMPV signal is passed from the head amplifier to the signal electronics IC [7007] With the aid of an internal low pass, the 627kHz chroma signal is filtered from the FMPV signal. The ACC amplifier amplifies and regulates the chroma amplitude In the main converter, the chroma signal is mixed with 5.06 MHz to the original 4 43 MHz. The 5.06 MHz are generated during playback by the free-running quartz oscillator and the (40+1/8) fh = 627 kHz frequency derived from the 321fh-VCO After the main converter, most of the adjacent crosstalk is removed from the chroma signal by 2H comb filters [7003] The chroma signal is then filtered by a band pass, checked by the colour killer, looped-through via pin 46 and 45 and added to the Y signal.

7.3.3 Chroma MESECAM DK

The signal path is nearly identical to that of the PAL system.

Differences to the PAL system:

- The 321 fH VCO is synchronised by the sync
- No phase rotation
- The comb filter is not active
- Internal band pass filters have a wider band width
- The deck microprocessor [7400] generates the control signal for SECAM B/G via IIC-Bus

7.3.4 Chroma SECAM L

During playback, the FM-Signal is passed from the band (FMPV) to pin 23 [7110], amplified by 6dB, passed through the same band pass as during recording and is then amplified once again by 10dB. From pin 16, the NF preemphasis of the recording is cancelled The anticloche circuit from the recording now acts as a cloche circuit
The signal is modulated in the subsequent stages (AGC) and its frequency is doubled The band pass at pin 10 removes unwanted harmonics from the signal before its frequency is doubled again In order for the signal to become a standard Secam chroma signal, it is provided again with a RF preemphasis (anticloche) The chrominance signal then passes through a colour killer stage, a band pass filter and an emitter follower [7106], before reaching pin 46 of the signal electronics IC [7007] as a CSP signal via a coupling capacitor.

7.3.5 NTSC

During playback of NTSC signals, the original NTSC chroma is converted to a PAL chroma signal (control signals, see above) This requires an internal IC conversion in the chroma part, as well as a conversion in the CCD-IC [7003] to an 1H comb filter for crosstalk reduction Line and picture frequencies do, however, remain unchanged according to the NTSC standard

7.3.6 PAL M,N

as chroma PAL (7.3.2)

8. Audio linear AL (VS-, IO-, AL - Part)

The signal inputs for recording or loop-through (EE) are pins 71, 73 and 75 of LA71525 [7000] During record and EE, the selected signal passes through the linear amplifier and then to the mute stage before leaving the IC at pin 77. This is the output leading to the IN/OUT part or the AF part in stereo units The attenuation chain at pin 77 sets the level required for the ALC (**A**utomatic **L**evel **C**ontrol) detector, whose time constant is determined at pin 72, and the level for the recording amplifier L5601,R3657 and C2657 form the preemphasis for the recording amplifier.
The output of the recording amplifier is pin 1 Resistor [3604] then adds the recording current to the bias current, from which the current passes via the head to pin 5, where the switch is closed During playback, the switch is closed at pin 7. The playback signal is amplified in the equaliser stage (time constant between pin 8 and pin 9) and the Pb level [3160] is set with the potentiometer. The potentiometer [3160] compensates for amplifier and head tolerances. The resistor [3605] and the capacitor [2600] determine the head resonance during playback
In longplay, mode the frequency characteristic is adapted with RC networks [C2656, R3655] for record and [C2601] for playback
The known circuit , running at approx 70 kHz, is used as the erase oscillator for the erasing heads and bias current To avoid interference peaks, the oscillator should be switched on slowly (switching stage T7603, time constant C2617, R3623 and current limiter R3625)
The bias current is set with the potentiometer [3618].

9. IN/OUT (VS-,IO-, AL - Part)

9.1 General:

The signal (VSB / VOUT) from the output of the signal electronics IC [7007] pin 38 or OSD [7800] pin 13 is offered to the TUMOD [1701] pin 1 as VMCO via the emitter follower [7501 / 7500]
After the Video- Input selector of the signal electronics IC [7007], the VREC signal is available at pin 34. The signal is passed to pin 35 (Y and PAL chroma signal processing), to SECAM VS part (SECAM chroma) and to the VPS/PDC part (data recording).

9.2 Video: 1-Scart devices

The selection of the video signal is exclusively made by the signal electronics IC The frontend signal VFV (IN3/Pin 32) and VBS (IN1/ pin 28) are directly applied The VBS signal in the I/O part is directly connected to VIN1 via [3509/3510]
IN2 pin 30 of the signal electronics IC is used as ´Mute position´ (active during playback)

9.3 Video: 2-Scart devices

The STV6400 [7507] receives the following signals at the inputs VFV, VIN1, VIN2, VFR, VOUT (via emitter follower 7501) In the STV6400, the input for the signal electronics signal VOUT (2 Vpp) contains a divider (1/2) The outputs pin15 and pin16 contain a 6dB-amplifier and feed the signal to the respective Scart connector OUT1 Pin2 has no amplifier, this output leads to the signal electronics VS (VBS) at the Video- Input selector (IN1/pin 28) In 2 Scart sets, the video input selector of the signal electronics IC is always set to IN1
The front controller switches the individual input signals to the respective outputs via the IIC bus.

9.4 Audio: 1-Scart mono

The input select is IIC bus controlled in the signal electronics IC [7007]. For this purpose, a selection can be made between the AIN1 pin 71 and AF1 pin 73 signals
The output signal AMLP pin 77 is applied to Scart 1 and the modulator

9.5 Audio: 2-Scart mono

The input select is IIC bus controlled in the signal electronics IC [7007] For this purpose, a selection can be made between the AIN1 pin 71 and AF1 pin 73 and AIN1 pin 75 signals. The output signal AMLP pin 77 is always applied to the modulator
The output signal for Scart 1 is selected with 1/3 HEF4053 [7513] by the control line MON pin 9 from AMLP pin 5 and AIN2 pin 3.
The output signal for Scart 2 is selected with 1/3 HEF4053 [7513] by the control line DEC pin 10 from AIN1 Pin2 and AF1 pin 1

9.6 Decoder operation: (REC or STOP)

9.6.1 Program position with decoder (Frontend)

The frontend signal is supplied to the decoder connected to Scart 2 and from there via VIN2 or AIN2 back to the VCR
9 6 2 is not possible for these program positions

9.6.2 External input with decoder

The signal from Scart 1 (normally TV set) is supplied to the decoder connected to Scart 2 For scrambled programs, the decoder switches pin 8 to high The VCR then passes the decoded signal from Scart2 to Scart1.

10. Audio AF-, I/O part for stereo sets (AF part)

10.1 General:

All audio input and output selection switches as well as the linear audio and the hi-fi FM audio signal processing are arranged in the TDA9604 [7850] This IC is exclusively controlled by the IIC bus. The carrier frequencies and band pass filters for the FM audio part are independently adjusted by the TDA9604. This adjustment is started via the IIC bus after a mains reset The HP2 signal is used as a reference for this purpose (pin 40)

10.2 Audio IO

The input and output selection switches are exclusively controlled by the IIC bus Audio signals from the frontend, both Scart sockets and the front sockets are passed via pins 1 to 8 to the two input selection switches, which select the respective signals for the FM and linear audio part. The output selection switch for Scart1 and Scart2 (pins 9,10 or 15, 16) independently select the respective signal sources
The RFAGC limits the maximum amplitude of the signal to the modulator (AMCO) to prevent overmodulation.
The TRIA / ALI line passes (controlled via IIC) the size of the audio signals or the level of the playback envelope curve (3.5 nominal at PB) to the deck processor. These audio levels are required for recording from the SCART and front sockets to prevent overmodulation of the FM carrier. (In case of excessive audio signals, these are attenuated via the IIC bus with the aid of the VOLUME regulator).

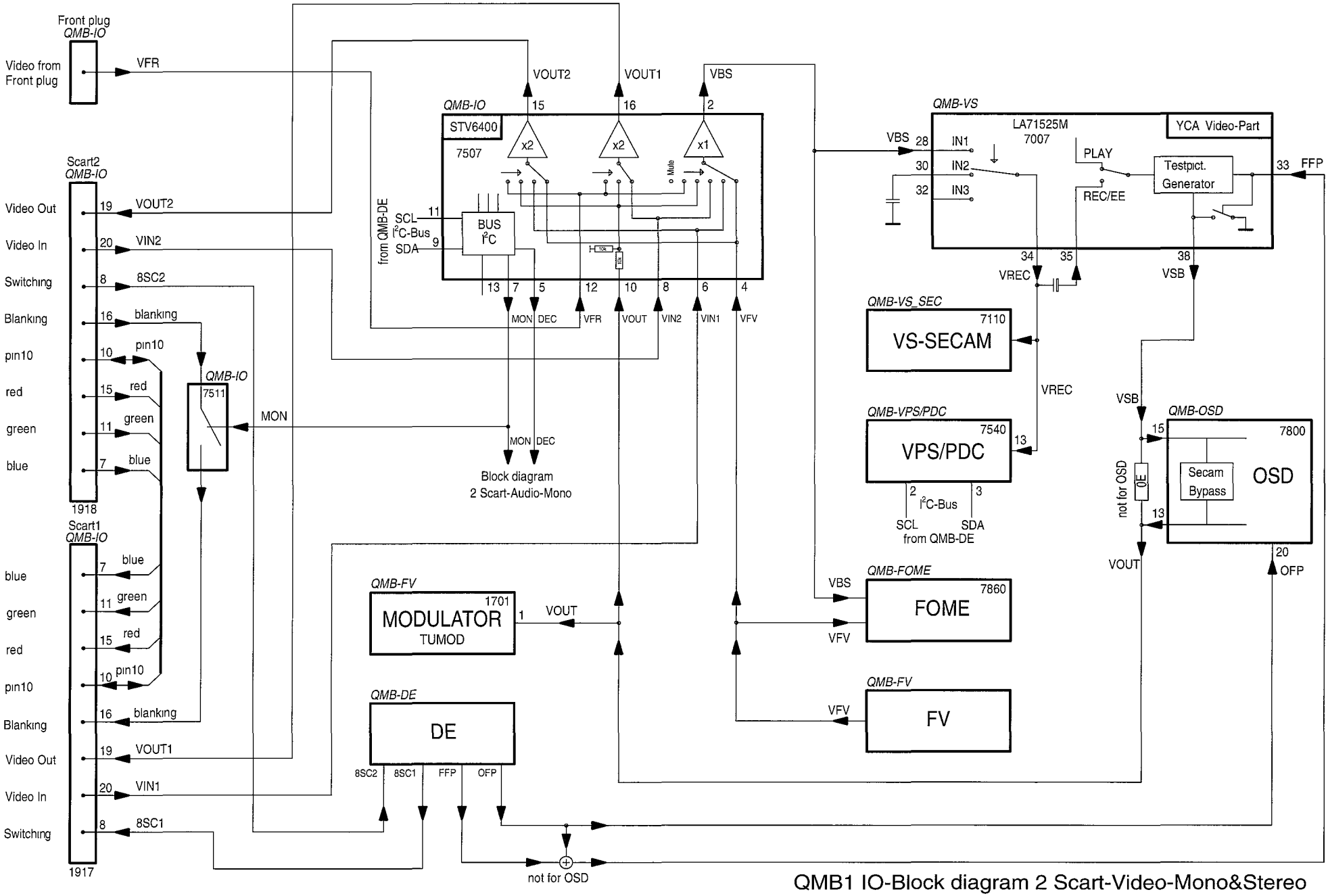
10.3 FM audio

10.3.1 Recording:
The signal from the input selection switch (INPUT SEL) is passed via a level adjuster (VOLUME) and a low pass filter (fg> 30kHz) to the NOISE REDUCTION block, compressing the dynamics during recording The compressed signal is passed to both FM modulators (1 4MHz and 1 8MHz carrier frequencies) Both carriers are added and are passed to the head amplifier via pin 36

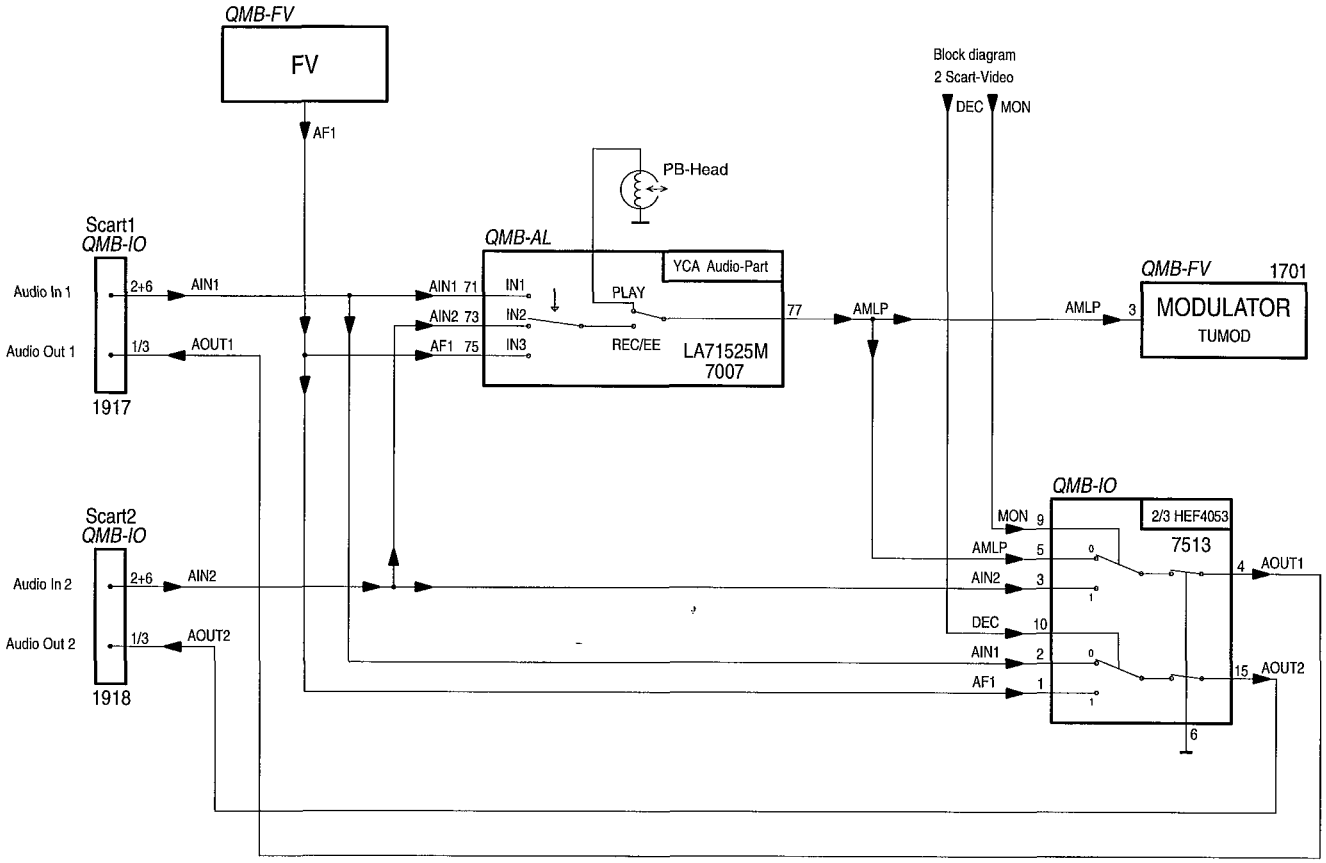
10.3.2 Playback:
The signal from the head amplifier is passed to the HF-AGC via pin 37 where the tape and heads tolerances are compensated The FM signals are passed to the PLL demodulators via both band pass filters and the limiter Using a Sample & Hold stage, head switching noise is cancelled (triggered by HP2 signal) The demodulated signals are then expanded in the Noise Reduction stage. Next, the hi-fi signals are available at the output selection switches If no FM playback is present, the IC automatically switches the output selection switches to linear audio.

10.4 Linear audio interface

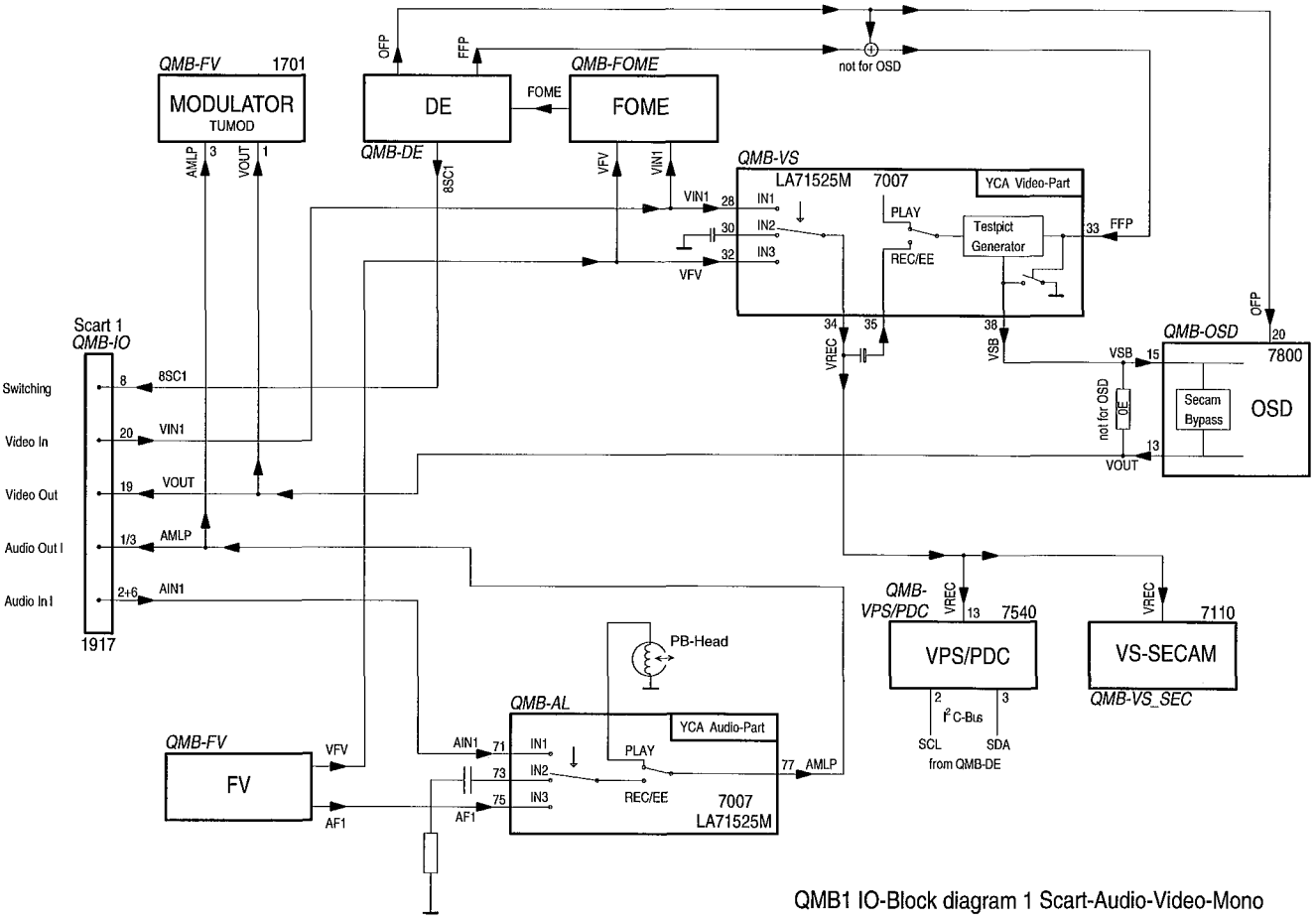
In recording mode, the input selection switch NORMAL SEL in the TDA9604 [7850] selects the audio source for the linear audio part in the signal electronics IC (LA72525) and passes this signal to pin 17 (AMLR).
In stereo sets, the input selection switch of the signal electronics IC LA71525 [7007] is always set to IN2 (pin 73)
During playback, the AMLP signal is passed from the linear audio part in the signal electronics IC pin 77 via pin 19 of TDA9604 [7850] to the PB level adjuster (NILevel), which can be adjusted via the IIC bus in the service mode.



QMB1 IO-Block diagram 2 Scart-Video-Mono&Stereo

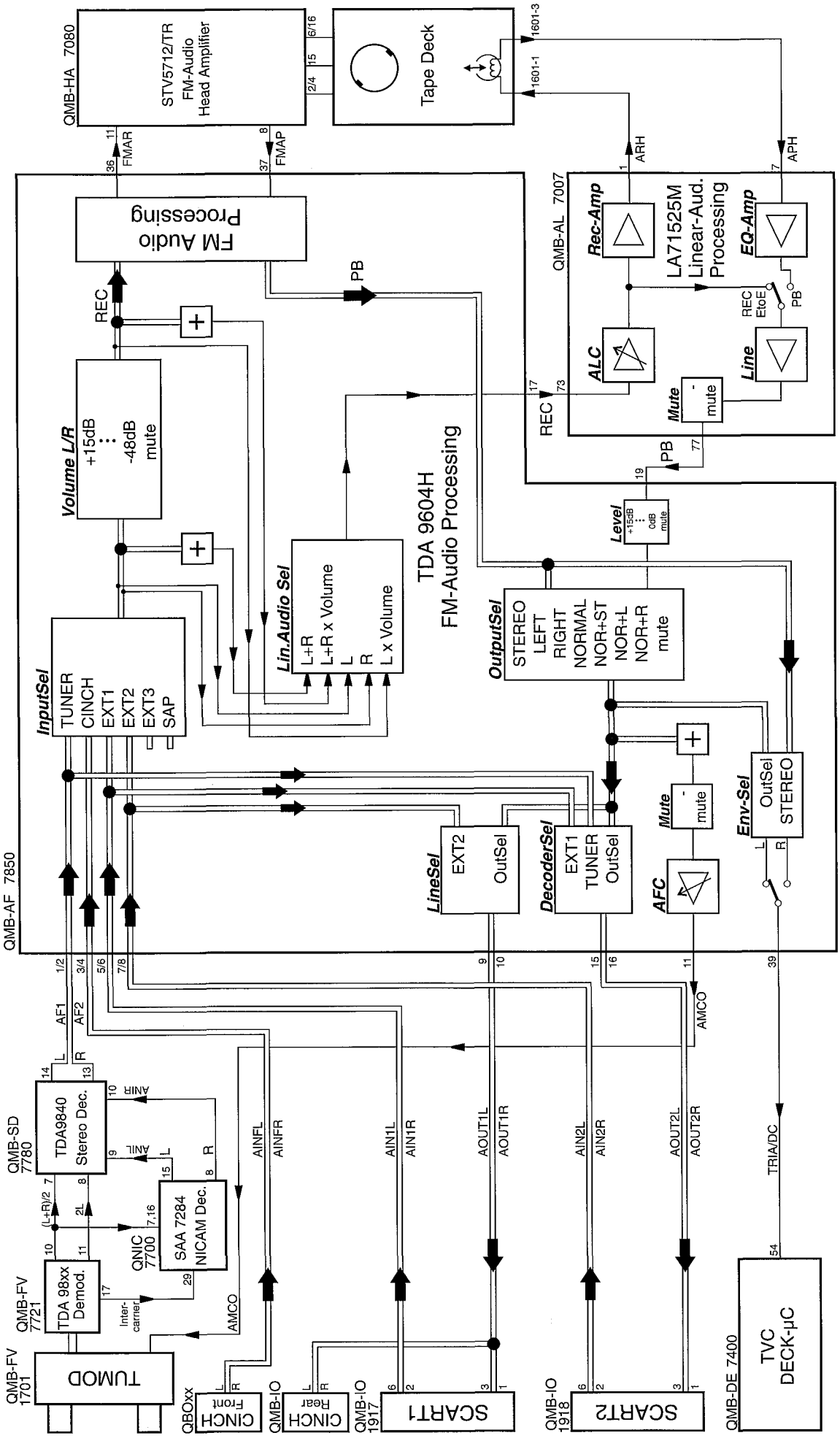


QMB1 IO-Block diagram 2 Scart-Audio-Mono



QMB1 IO-Block diagram 1 Scart-Audio-Video-Mono

Simple Blockdiagram FM Audio / Linear Audio processing



SERVICE MODES

1. Special functions

Erasing the EEPROM

- Disconnect from mains

- Push and hold down the Standby key, reconnect to mains and keep the Standby key depressed for a further 3 sec.

All EEPROM data will then be erased and initialised (timer and transmitter channels) The internal processor RAM will also be erased, but the option codes, deck parameters and adjustment values are maintained

After changing the EEPROM or MOBO

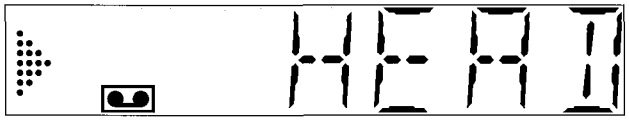
the following steps must be carried out:

Step 40: Option code input
Step 51: Gap position adjustment
Step 52: 'Studio Picture control' adjustment
Step 53: Input of clock correction
Step 60: Level adjustment - Stereo (optional)
Step 61: Channel separation adjustment - Stereo (optional)
Step 62: Adjustment of Audio Linear Playback Level (optional)
Step 99: Clock frequency output

Video head cleaning

With the recorder set to PLAY, the video heads can be cleaned by pressing the PLAY key again for more than 5 sec The recorder then moves to STOP and the video head cleaning roll is pressed against the running head drum for 10 sec The recorder automatically returns to PLAY

The display shows:



2. Service test program

2.1 Introduction

The software program for the control, deck and operating microprocessors includes a service test program It was divided into the following steps, with the following 'modes'·

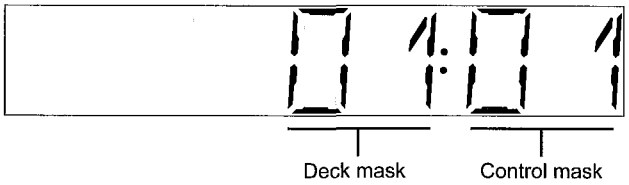
Step 00: Display of mask version number
Step 01: Check of the drive positions
Step 02: Display of the deck - error codes
Step 03: Deck - sensors and manual tracking
Step 04: Display of operating hours counter
Step 10: Operation without drive - dummy mode
Step 40: Option code input
Step 51: Gap position adjustment
Step 52: 'Studio Picture control' adjustment
Step 53: Input of clock correction
Step 60: Level adjustment - Stereo (optional)
Step 61: Adjustment of channel separation - Stereo (optional)
Step 62: Adjustment of Audio Linear Playback Level (optional)
Step 99: Clock frequency output

In the service test program, all drive functions apart from the channel search and channel change mode can be carried out The program position set **before** entering the service test program is maintained.

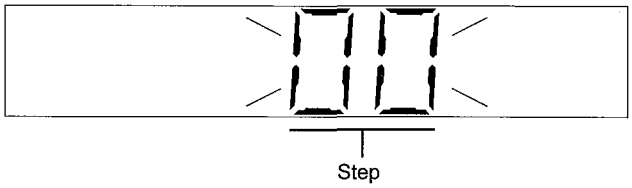
2.2 Activating the service test program

Press and hold down the STOP key on the remote control Then press the PLAY key on the recorder and keep it depressed for at least 5 sec. The STOP key on the remote control may be released whilst the PLAY key on the recorder is pressed.
The service test program can be selected in any operating mode apart from the channel search, install, clock set-up and cassette length calculation mode. The recorder and all drive functions are fully operational in the service mode.

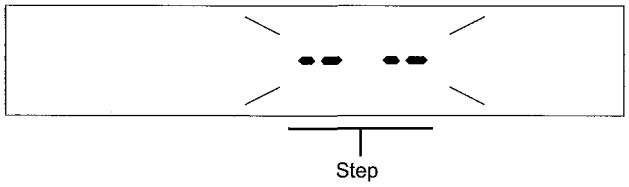
The display shows, for instance:



By pressing the SELECT key on the remote control, all step modes may be left and the currently selected step number appears and flashes



Other service steps are selected with the UP and DOWN keys or the numerical remote control keys By pressing the SELECT key on the remote control whilst the Step is flashing, the respective mode can be entered or left
If a step is selected to which no mode is assigned, the displays shows - - and flashes



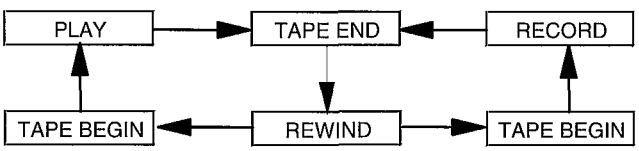
To leave the service program, press the STAND-BY key or disconnect recorder from mains

2.3 Service mode functions

Endurance test

In the service test program, the recorder can be endurance tested. For this purpose, use a cassette and activate "PLAY" or "REC". The functions are then repeated continuously. In RECORD, the recorder does not move to EJECT at the tape end, but to REWIND, after which it starts to RECORD again This test serves to detect intermittent faults. The last error is stored in the EEPROM (The fault remains stored even after a power failure)

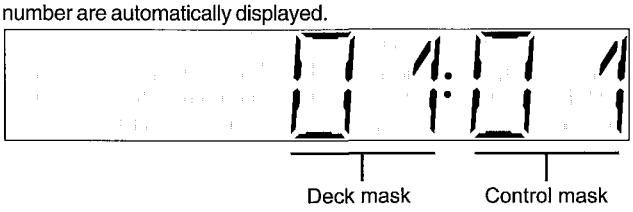
The endurance test is ended by pressing STOP or leaving the service test program



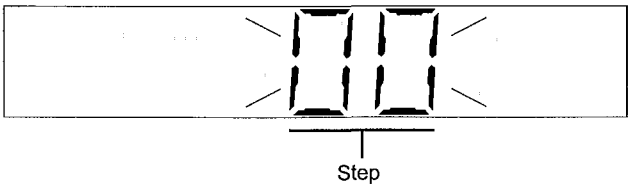
2.4 Description of steps with modes:

Step 00: Display of mask version number

After activating the service test program, step 00 and the mask version number are automatically displayed.



The mode can be left again by pressing the SELECT key on the remote control The currently selected position number appears and flashes on the display



A step between 00 and 99 can now be selected.

Step 01: Checking the drive positions

By pressing the SELECT key whilst Step 01 is flashing, the drive position appears on the display
The FTA signal from the photoelectric barriers which controls the revolutions of the loading motor is used to check the drive condition
The drive position is shown as a 3-digit decimal number by counting the FTA pulses on the display.

(e.g. 213 = Play)

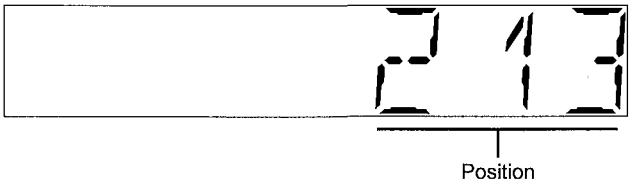
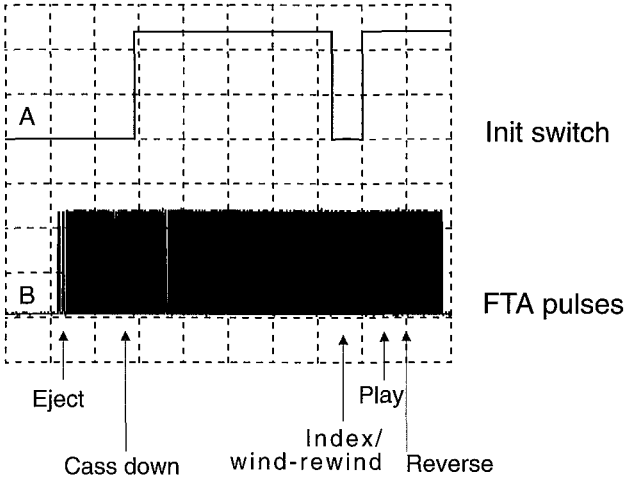


Table of drive positions:

Status	Position (FTA dec)
Eject	007 +2/-2
Index	191 +0/-2
Stop	200 +4/-4
Play	213 +4/-4
Reverse	237 +2/-0

Function of the Init switch:
The diagram shows the function of the Init switch, depending on the position of the deck. The number of FTA pulses is important for the position of the drive.

A: DC, 2 V/Div, 0.5 s/Div
B: DC, 2 V/Div, 0.5 s/Div



Step 02: Display of the deck error codes

By pressing the SELECT key whilst Step 02 is flashing, the deck error code is shown on the display.

Checking the drive function
Loading and unloading time
The signal (FTA) of the photoelectric barrier which controls the revolutions of the loading motor is used as a reference for the loading and unloading time

Stopping of supply or take-up reels
The tacho signals of the left (WTL) and right (WTR) winding disks are used as control reference

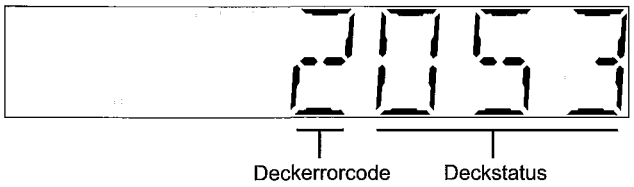
Stopping of head drum motor
This is monitored with the PG/FG signal. The signal is discharged from the e.m f. of the non-conducting spools of the head cylinder motor, showing the position of the head cylinder.

Capstan motor fault
This is monitored with the FGD signal

If one of the above sensor signals is not available, the recorder tries to put the lift into the "EJECT" position.

Explanation of deck error codes and deck error status
The last error code is stored and remains in the EEPROM, even if the recorder is disconnected from the mains
The error code can be **erased** by pushing the CLEAR button on the remote control

The display shows, for instance:



The left digit shows the error:
(e.g.: Error 2 = Capstan error)

Error table:

0	no error
1	threading error
2	no capstan pulses
3	tape broken
4	no pulses left reel
5	no pulses right reel
6	head motor error

The 3 digits on the right represent the deck error condition:
(e.g.: 053 = during Play)

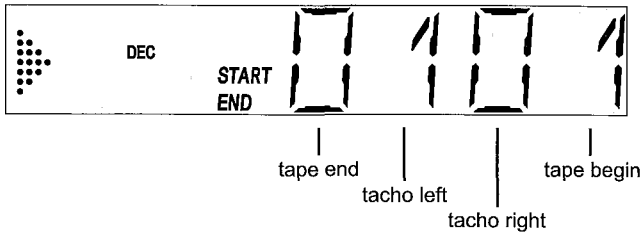
Functiontable:

012	Standby	114	VISS write	211	Slowmotion 1/24
014	Autotracking	115	Viss erase	212	" " 1/14
031	Play-3	125	Tuner - Stopout	215	" " 1/7
034	Slow_reverse	126	Auto Remain Funct	216	" " 1/2
041	Still Picture	130	ATTS Function	217	" " -1/24
042	Fast	168	Frame+	218	" " -1/14
044	Play-9	169	Frame-	219	" " -1/7
045	Eject	170	Play-11	220	" " -1/2
046	Play9	171	Play-7	222	Edit Record
047	Play-1	172	Play-5	223	Align of Gap
048	Pause	173	Play5	238	Pause
050	Rewind	174	Play7	239	SPC align
052	Wind	175	Play11	246	Edit Pause
053	Play	196	Tuner - Eject	247	Slow motion 1/10
054	Stop out	197	Standby Eject	248	" " 1/18
055	Record	199	Audio Dubbing	249	" " -1/10
112	Index next	202	Audio Dubb Pause	250	" " -1/18
113	Index previous	206	Reset Tapecounter	253	Key Released

The error code can be reset in this step with the CLEAR key

Step 03: Deck sensors and manual tracking

By pressing the SELECT key whilst step 03 is flashing, the deck sensors will be displayed in one digit as either 1 or 0



■ ● ◄ ► are used to display the deck status
START init switch (INIT)
END record protection (RECP)
DEC Loading pulses (FTA)

In the service test program, the tracking is always in the centre position
Only in this step can the value for the required tape running setting be changed, manually in the PLAY function with the UP / DOWN keys. After leaving the mode with the SELECT key, the tracking value always resets itself to the centre position and cannot be changed

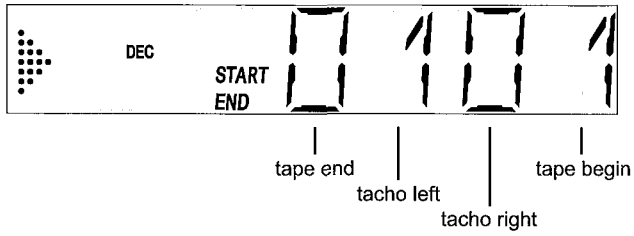
Step 04: Display of the operating hours counter:

By pressing the SELECT key whilst step 04 is flashing, the operating hours counter shows how many hours the head disk has turned. The hours are displayed as a 4-digit decimal number.

Step 10: Operation without drive - dummy mode

Before activating this mode with the SELECT key, the recorder must be in the EJECT position.

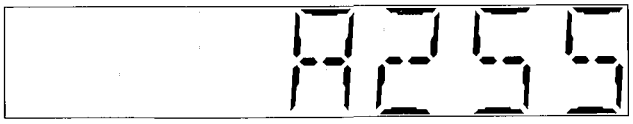
Enter the mode by pressing the SELECT key The motors are then switched off and the sensors will be ignored by the deck microprocessor The drive can now be dismantled from the motherboard (see dismantling instructions) **Only install drive if recorder is disconnected from mains.** For signal tracking, the recorder can be set to all drive conditions, i e signal electronics, audio and IO processing are switched to the respective operating mode



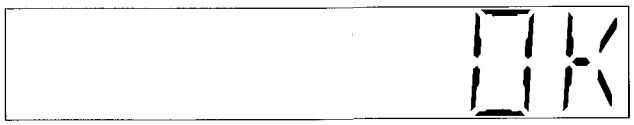
■ ● ◄ ► are used to show the deck status
START init switch (INIT)
END record protection (RECP)
DEC loading pulses (FTA)

Step 40: Option code input

If a new EEPROM is installed in the course of repairs, it must be initialised
By pressing the SELECT key whilst step 40 is flashing, the decimal option A appears in the display.



By entering a 3-digit decimal code, the correct features are set
These codes are shown on the type-plate of the recorder.
After pressing the OK key on the remote control, the entered code is saved. The display shows OK for approx 3 sec. and then the stored value in decimal format



By pressing the UP and DOWN keys, the available options (A to E) can be selected The display shows the last stored value in decimal format.

In case of an invalid entry (value >255) the activation of the OK key causes the content of the last stored option to be displayed and OK does not appear in the display.

Depending on the model, some bits are software or default protected and cannot be changed by an entry In this case, the display shows OK, but the display returns to the **default value.**

3. Adjustments in the service test program

Step 51: Setting the gap position (GAP)

Purpose. To determine the correct head switching point during playback

Symptom if incorrectly set
Head switching fault and/or vertical picture flickers.

- Enter the service test program whilst step display is flashing, and enter the step number using the numerical keys
- Insert a test cassette (e g 4822 397 30103) with the standard video signal in the VCR
- By pressing the SELECT key whilst step 51 is flashing, the automatic adjustment is triggered and stored in the EEPROM

After a correct adjustment, the display shows 1, 0 when incorrect.
To leave the step, press Select

Causes of incorrect adjustment Incorrect standard video signal
Scanner fault
Microprocessor fault

Step 52: "Studio Picture control" adjustment

Purpose Adjustment of the reference level for the SPC.

Symptom if incorrectly set:
The picture is played back at a lower resolution than would be possible.

TP	ADJ.	MODE	INPUT
		Stop Service Mode	RF or A1- input, black picture without BURST
TAPE		MEAS. EQ.	SPEC.
SPC Alignment Tape			Call up Step 52 of Service Mode

- Video signal via Scart or aerial
- Enter the service test program and, whilst the step is flashing, input the step number 52, using the numerical keys.
- Insert cassette (not a SVHS cassette).
- By pressing the SELECT key whilst step 52 is flashing, the recorder makes a recording in SP mode (approx 10 sec) and in LP mode (approx 10 sec), rewinds and carries out a playback with automatic adjustment
- After a correct adjustment, the display shows 1 and 0 for incorrect adjustments.

To leave the step press SELECT.

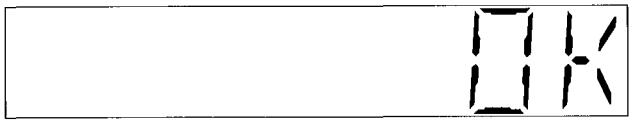
Step 53: Inputting the clock correction

Before carrying out step 53, the correction value must be established in step 99.

By pressing the SELECT key whilst step 53 is flashing, the display shows, for instance.

Using the numerical keys of the remote control, the established correction value from Step 99 is entered as a 3-digit number (value must be between 0 and 255)

After pressing the OK key on the remote control, the entered code is stored, the display shows OK for approx 3 seconds and then the stored value in decimal format



In case of an invalid entry (value >255), the activation of the OK key causes the content of the last stored value to be displayed and OK does not appear in the display.
To leave the step press Select.

Step 60: Level adjustment of Stereo TDA9840 (only for stereo units)

Purpose: Amplification adjustment of stereo demodulator TDA9840 [7780].

Symptom if incorrectly set:
Sound is too low or too loud

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	refer to description	Stop Stereo	RF - input,white picture,1kHz sound only on right channel +/-27kHz deviation
TAPE		MEAS. EQ.	SPEC.
		AC Millivoltmeter	500mV$_{RMS}$ ±50mV

By pressing the SELECT key whilst step 60 is flashing, the output select is switched to stereo and the display shows, for instance

- Connect the millivoltmeter to Scart1 pin1(Audio out right)
- The level on Scart 1, Pin1 (Audio out) can be adjusted to the set value by pressing the UP (value increases) or DOWN key (value decreases).
  (The amplitude changes by 0 5 dB each time the key is pressed)
  The range is shown in the display with the numbers 1-9.
- The value is automatically stored in the EE-PROM each time the key is depressed

After leaving the step with SELECT, the last value will be stored in the EE-PROM

Step 61: Adjustment of stereo channel separation Stereo TDA9840

Purpose: Adjustment of channel separation of the stereo demodulator TDA9840 [7780]
Symptom if incorrectly set·
Crosstalk between left and right channel.

TP	ADJ.	MODE	INPUT
Pin 3 of Scart 1 (Audout left)	refer to description	Stop Stereo	RF - input,white picture,1kHz sound only on right channel +/-27kHz deviation
TAPE		MEAS. EQ.	SPEC.
		AC Millivoltmeter or Oszilloscope	lowest value

By pressing the SELECT key whilst step 61 is flashing, the output select is switched to stereo and the display shows, for instance

- Connect Millivoltmeter to Scart1 Pin 3 (Audio out left)
- The noise amplitude on Scart 1 Pin 3 (Audio out left) can be adjusted to the lowest value by pressing the UP(+) or DOWN (-) keys
  (The amplitude changes by 0 1 dB each time the key is pressed)
  The range is shown in the display with the numbers 0 49
- The value is automatically stored in the EE-PROM each time the button is pressed

After leaving the step with SELECT, the last value remains stored in the EE-PROM.

Step 62: Adjustment of the Audio-Linear-Playback level (only for stereo units)

Purpose Adjustment of the amplification of the audio linear playback
level TDA9604H [7850]
Symptom if incorrectly set:
The linear playback sound is too low or too loud

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	refer to description	SP Self-recording and Playback	(AUDIO IN E1) 700mV$_{RMS}$ 1kHz
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivoltmeter	500mV$_{RMS}$ ±50mV

By pressing the SELECT button whilst step 62 is flashing, the output select is switched to Mono and the display shows, for instance:

- Make a recording of the audio signal on E1
- Connect the millivoltmeter to Scart1 Pin1(Audio out) and play the recording back
- The level on Scart 1, Pin1 (Audio out) can be adjusted to the set value by pressing the UP (value increases) or DOWN keys (value decreases)
  (The amplitude changes by 1 dB each time the key is pressed)
  The range is shown in the display by the numbers 0 15
- The value is automatically stored in the EE-PROM each time the button is pressed

Step 99: Clock frequency output

Purpose: Setting the exact clock function

Symptom, if incorrectly set
The clock is too fast or too slow.

After entering with SELECT, the display is switched off and no further function can be carried out At the HEST measuring point [7201 pin 80], the uncorrected clock frequency of approx 2048 Hz is always output.
Measure the output frequency with the calibrated counter (minimum resolution of 6 digits) and note down the value (f_{mess}).

Determining the deviation (in ppm):

f_{mess} ..measured frequency
f_{nom} set frequency (2048,000 Hz)

Deviation = $1x10^6 x (f_{mess} - f_{nom}) / f_{nom}$

Determining the correction value for Step 53:

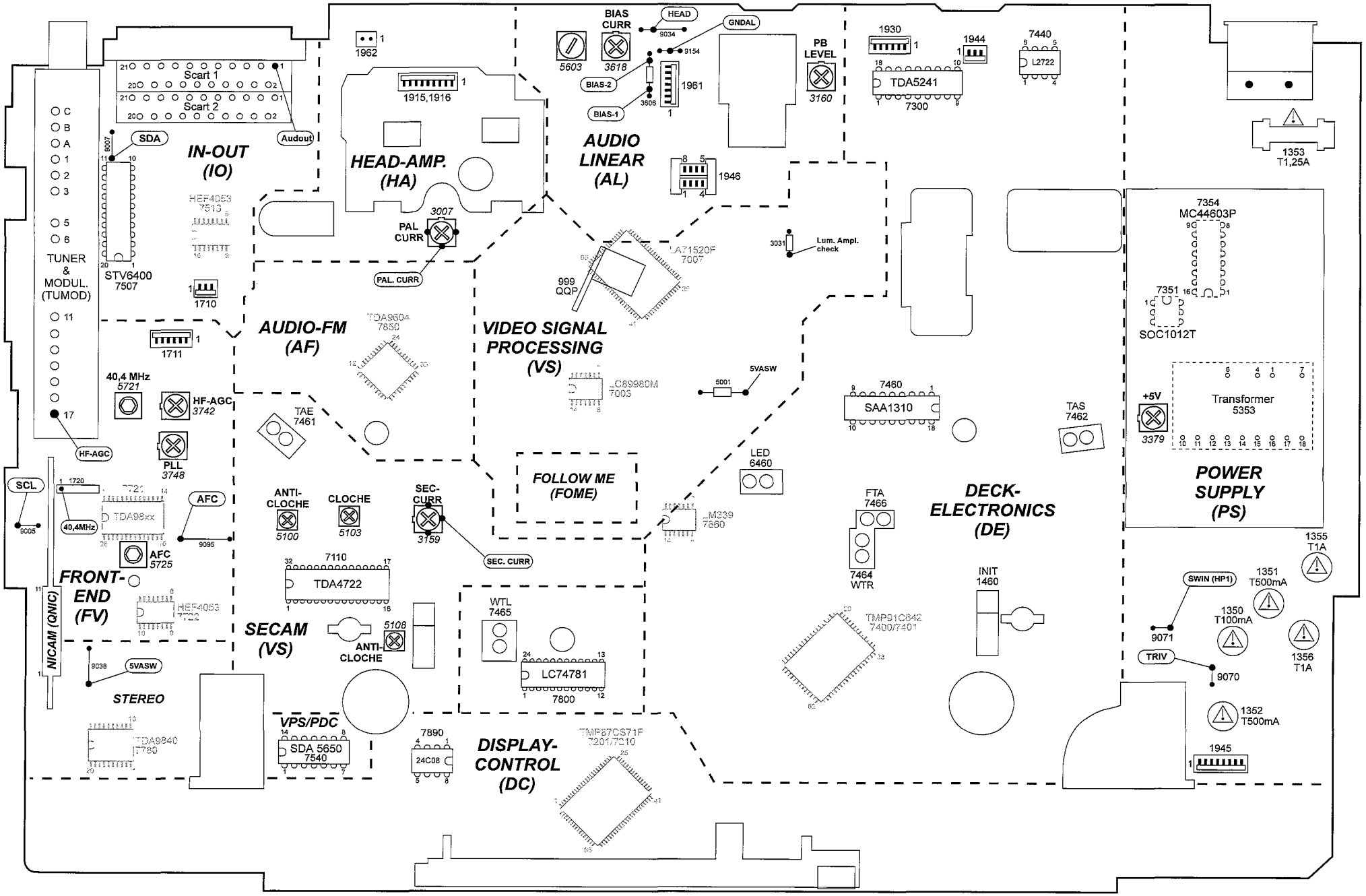
Correction value = Deviation / 0 763 + 128 (round off to whole number)

The calculated **correction value** must be between 0 and 255 (change quartz otherwise), and must be entered in Step 53 and saved
This Step can only be left by performing a **mains reset**, after which the service program must be entered again before Step 53 can be called up

Example:

f_{mess}=2047 97Hz **f_{nom}=2048.00Hz**

Deviation = $1x10^6 x$ (2047.97 - 2048) / 2048 = -14 648
Correction value = -14 648 / 0 763 + 128 = 108.80 = **109**

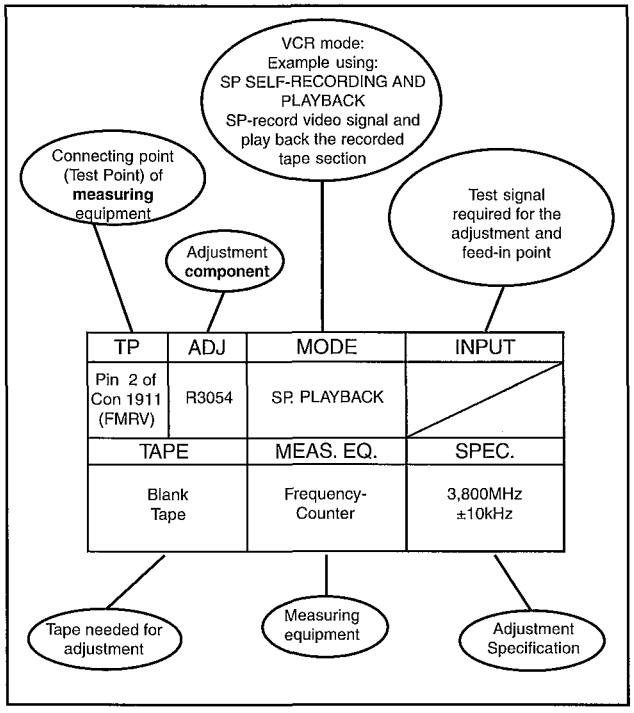

IN-OUT (IO)
HEAD-AMP. (HA)
AUDIO LINEAR (AL)
AUDIO-FM (AF)
VIDEO SIGNAL PROCESSING (VS)
FOLLOW ME (FOME)
FRONT-END (FV)
SECAM (VS)
STEREO
VPS/PDC
DISPLAY-CONTROL (DC)
DECK-ELECTRONICS (DE)
POWER SUPPLY (PS)
Scart 1
Scart 2
Audout
SDA
TUNER & MODUL. (TUMOD)
STV6400 7507
HEF4053 7513
1710
1711
1962
1915,1916
3007
PAL CURR
PAL. CURR
BIAS CURR
HEAD
GNDAL
BIAS-2
BIAS-1
5603
3618
9034
9154
3606
1961
PB LEVEL
3160
1946
1930
1944
7440
L2722
TDA5241
7300
1353 T1,25A
7354 MC44603P
7351
SOC1012T
Transformer 5353
+5V
3379
999 QQP
LA71520F 7007
3031
Lum. Ampl. check
TDA9604 7650
40,4 MHz 5721
HF-AGC 3742
PLL 3748
TAE 7461
LC89980M 7003
5001
5VASW
7460
SAA1310
TAS 7462
LED 6460
SCL
9005
40,4MHz
AFC
5725
9095
TDA98xx
ANTI-CLOCHE 5100
CLOCHE 5103
SEC-CURR 3159
SEC. CURR
M339 7660
FTA 7466
7464 WTR
INIT 1460
7110
TDA4722
5108
WTL 7465
LC74781
7800
TMP91C642 7400/7401
NICAM (QNIC)
9038
5VASW
TDA9840 7780
SDA 5650 7540
7890
24C08
TMP87CS71F 7201/7210
SWIN (HP1)
9071
TRIV
9070
1355 T1A
1351 T500mA
1350 T100mA
1356 T1A
1352 T500mA
1945

ADJUSTMENT INSTRUCTIONS

Test equipment:

1. Dual-trace oscilloscope
   Voltage range 0.001 ~ 50 V/div
   Frequency : DC ~ 50 MHz
   Probe : 10.1, 1.1
2. DVM (Digital voltmeter)
3. Frequency counter
4. Sinus generator
   Sinus : 0 ~ 50 MHz
5. Test pattern generator
6. VHS Alignment Tape 4822 397 30103

How to read the adjustment procedures:



1. Power supply - QMB (PS)

Service tasks after repairing the power supply:

1.1 Setting the output voltage +5VASW [3379]:

Purpose To set the correct supply voltage

Symptom, if incorrectly set
VCR functions are not operating correctly

TP	ADJ.	MODE	INPUT
wire +5VASW	R3379	Playback	
TAPE		MEAS. EQ.	SPEC.
Any tape		DC Voltmeter	5,3V ±0.03V

2. Video signal processing-QMB (VS,AL,I/O)

Service tasks after replacement of ICs 7007, 7110:

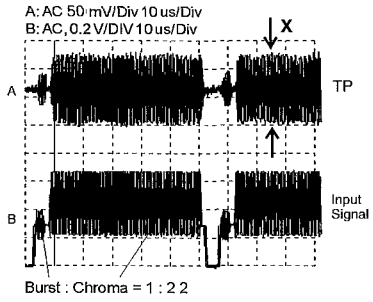
Purpose To set the optimum record PAL or SECAM chroma level.
Symptom, if incorrectly set
If the record level is too high, beats may appear on the picture If the level is too low, the colour may be de-graded.
Before commencing adjustment:
Call the service test program and enter Step 10 (Dummy mode) Remove the drive from the motherboard Control the luminace amplitude on TP R3031:

TP	ADJ.	MODE	INPUT
Pos. R3031 (emitter side)		Dummy mode Record Preset E1	(VIDEO IN E1) Red Picture PAL 75% Saturation
TAPE		MEAS EQ.	SPEC
Blank Tape		Oscilloscope Video Pattern Generator	420 mV_{pp} ± 40 mV_{pp}

2.1 PAL chrominance record current adjustment [3007]:

Connect resistor R3031 on the emitter side (T7006) with 5VASW of coil L5001

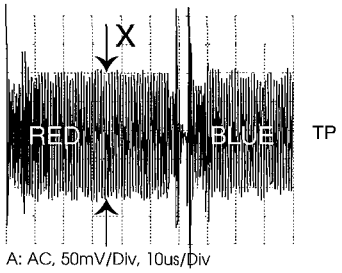
TP	ADJ.	MODE	INPUT
Pos R3007 (slider)	R3007	Dummy mode Record Preset E1	(VIDEO IN E1) Red Picture PAL 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	**X**=160 ± 20 mV_{pp}, for 2 heads VCR **X**=130 ± 20 mV_{pp}, for 4 heads VCR



2.2 SECAM chrominance record current adjustment [3159]:

Connect resistor R3031 on the emitter side (T7006) with 5VASW of coil L5001.

TP	ADJ.	MODE	INPUT
Pos. R3159 (slider)	R3159	Dummy mode Record of Preset E1	(VIDEO IN E1) Red Picture SECAM 75% Saturation
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Oscilloscope Video Pattern Generator	**X**=210 ± 30 mV_{pp}, measured in red line



3. Audio linear - QMB (VS, AL, I/O)

Service tasks after replacement of coil L5603, IC7007 or the audio heads:

3.1 Adjusting the erasing frequency [5603]:

Purpose. To set the correct recording erasing frequency

Symptom, if incorrectly set:
Erasing frequency or its harmonics cause audio faults

TP	ADJ.	MODE	INPUT
wire 9034 (HEAD)	L5603	Set tuned to channel 27 Record	PAL white picture, audio IF and modulation on
TAPE		MEAS. EQ.	SPEC.
Blank Tape		Frequency Counter	70kHz ±10kHz

3.2 Adjustment of playback amplitude [3160]: (mono only)

Purpose· To set audio part amplification

Symptom, if incorrectly set:
Playback sounds too faint or too loud

TP	ADJ.	MODE	INPUT
Pin 1 of Scart 1 (Audout)	R3160	SP Self-recording and Playback	(Video white picture) Audio in Scart 1, $700mV_{RMS}$, 1kHz
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivoltmeter, Video Pattern Generator	$500mV_{RMS}$ ±50mV

3.3 Adjustment of bias current [3618]:

Purpose: To set the optimum record bias current.

Symptom, if incorrectly set:
If the audio level is too high, the higher frequencies of the linear sound are too low
If the level is too low, the higher frequencies are too strong and sound distortions inrease

TP	ADJ.	MODE	INPUT
R3606 (difference measurement BIAS1 - BIAS2)	R3618	Set tuned to channel 27 Record	PAL white picture, audio IF and modulation on
TAPE		MEAS. EQ.	SPEC.
Blank Tape		AC Millivolmeter	$15mV_{RMS}$ ±$1mV_{RMS}$ (70kHz)

Checking the 'bias' adjustment

After the bias has been adjusted to the indicated level, record some music, play back the recording, and adjust the audio switch to "MONO"
Only use brand name cassettes, but not chrome dioxide tapes.
Check if sufficient treble is reproduced and for any audio distortion In case of insufficient treble, reduce 'bias' current a little In case of excessive distortion, increase 'bias' current a little.

4. Front End - QMB (VS, AL, I/O)

Service tasks after replacement of ICs 7720, 7721, coil L5725 and TUMOD:

4.1 AFC Adjustment:

Purpose: Correct adjustment of demodulator AFC - circuit

Symptom, if incorrectly set·
Bad or disturbed TV channel reception

4.1.1 PAL - AFC adjustment [5725]:

TP	ADJ.	MODE	INPUT
IC 7720 Pin 15	L5725	E to E	38,9MHz $500mV_{pp}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,2V

4.1.2 PAL/SECAM - AFC adjustment [5725] :

TP	ADJ.	MODE	INPUT
IC 7721 Pin 20	L5725	E to E	38,9MHz $500mV_{pp}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Frequ. Generator	2,5V ±0,2V

4.2 SECAM band 1 - AFC adjustment [3748]: (SECAM L / L' only)

Before commencing adjustment:

— Switch VCR to SECAM with SYSTEM key

TP	ADJ.	MODE	INPUT
IC 7721 Pin 20	R3748	E to E, SECAM L' tuned on this preset	33,9MHz $500mV_{pp}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		DC Voltmeter Freq. Generator	2,5V ±0,2V

4.3 Phase offset adjustment [3743]: (TDA9800T only)

After replacement of the IC TDA9800T [7720], the potentiometer pos. 3748 has to be removed from the motherboard The demodulator IC TDA9800T [7720] is automatically adjusted to a default value.

4.4 HF - AGC adjustment [3742]:

Service tasks after replacement of ICs 7720, 7721 or TUMOD·

Purpose· Set amplifier control.

Symptom, if incorrectly set:
Picture jitter if input level is too low and picture distortion if input level is too high

TP	ADJ.	MODE	INPUT
Tuner 1701 Pin 17	R3742	Set tuned to channel 27	4,5mV(74dBµV) on aerial input PAL white picture, audio IF on, no modulation
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope Video Pattern Generator	550mV$_{pp}$ +/-50mV (use a 10:1 probe)

4.5 Attenuating the 40.4 MHz [5721]: (SECAM only)

Service tasks after replacement of coil 75721:

Purpose: To attenuate the band I carrier rests

Symptom, if incorrectly set
Bad picture quality when the filter attenuates the picture carrier (38.9MHz).

TP	ADJ.	MODE	INPUT
OFW 1720 Pin 1	L5721	E to E	40 4 MHz, 300mV$_{rms}$ at Tuner 1701 Pin 17
TAPE		MEAS. EQ.	SPEC.
		Oscilloscope, Sinus Generator, Counter	adjust minimum amplitude

If the adjustment is correct the signal at pin 1 of SFW [1720] must be smaller than the input signal amplitude by at least 5 dB

Software adjustments in the service test program

5. Deck electronics - QMB (DE, DC)

Service tasks after replacement of the head drum or EEPROM.

5.1 Software adjustment of gap positions:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, and in the service test program in Step 51.

5.2 "Studio Picture control" adjustment:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, and in the service test program in Step 52

6. Stereo demodulator TDA9840 - QMB (FV)

Service tasks after replacement of IC7780 or the EEPROM·

6.1 Stereo level adjustment [7780]:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Step 60

6.2 Stereo channel separation adjustment [7780]:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Step 61

7. Audio HIFI TDA9604H - QMB (AF)

Service tasks after replacement of the audio heads, IC 7007 or the EEPROM:

7.1 Audio Linear playback level adjustment TDA9604H [7850]:

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Step 62.

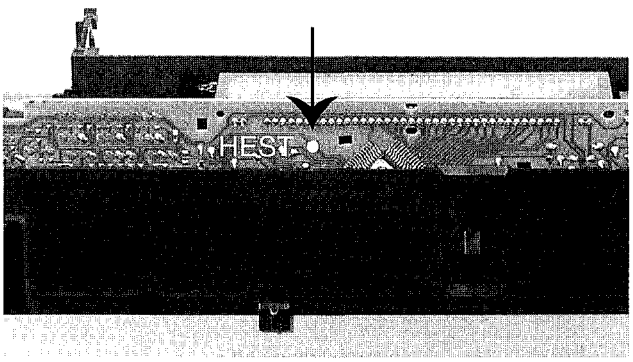
8. Display Control - QMB (DE, DC)

Service tasks after replacement of the clock quartz [1297] or the EEPROM:

8.1 Clock frequency adjustment:

The clock is corrected via software with the measurement of a frequency at the HEST measuring point [7201, pin 80] and computation of a correction factor.

Information about this adjustment is contained in the Fault Locating document, Chapter 2-20, in the service test program in Steps 53 and Step 99.



List of abbreviations

Signal	Description	Application											
+5AS	+5V analog after fuse 1700												QNIC
+5ASS	+5V digital, after coil 5706												QNIC
+5D	+5V digital			DE									QNIC
-28V	-28V display supply	PS			DC			IO					
-7V	-7V I/O-switches supply							IO					
12SW	+12V analog (< 6W switched)	PS					AL			FV			QNIC
12VA	+12V analog	PS						IO		FV	AF		
14VM1	+14V for threading- and headmotor	PS		DE									
2FSC	2x Colour subcarrier					VS						OS	
33V	+33V for tuner tuning voltage	PS								FV			
5VA	+5V analog	PS						IO		FV	AF	OS	
5VASW	+5V analog (< 6W switched)	PS	HA	DE		VS			SE	FV		OS	QNIC
5VASW2	+5V analog after coil 5802											OS	
5VASWB	+5V analog after coil 5726									FV			
5VD	+5V digital	PS		DE	DC					FV			
5VD1	+5V digital, after coil 5200				DC								
5VD2	+5V digital, after coil 5400			DE									
8SC1	Scart 1 pin 8 output			DE				IO					
8SC2	Scart 2 pin 8 input			DE				IO					
9/14VM2	Capstan motor supply, switched	PS		DE									
AEH1/2	Audio erase head						AL						
AF1	Audio from frontend, left						AL	IO		FV	AF		
AF2	Audio from frontend, right									FV	AF		
AFC	Automatic frequency control				DC					FV			
AFE	Audio from frontend									FV			QNIC
AGC	Automatic gain control			DE						FV			
AH1/2/C	Audio heads		HA										
AIN1	Audio input scart 1						AL	IO					
AIN1L	Audio input scart 1, left							IO			AF		
AIN1R	Audio input scart 1, right							IO			AF		
AIN2	Audio input scart 2						AL	IO					
AIN2L	Audio input scart 2, left							IO			AF		
AIN2R	Audio input scart 2, right							IO			AF		
AINFL	Audio left from Front connector							IO			AF		
AINFR	Audio right from front connector							IO			AF		
AMCO	Audio to the modulator									FV	AF		
AMLP	Audio mono playback						AL	IO		FV	AF		
AMLR	Audio mono record						AL	IO			AF		
AN1/2	Analog voltage from keyboard matrix				DC								
ANIL	NICAM Audio, left									FV			QNIC
ANIR	NICAM Audio, right									FV			QNIC
AOUT1L	Audio output from scart 1, left							IO			AF		
AOUT1R	Audio output from scart 1, right							IO			AF		
AOUT2L	Audio output from scart 2, left							IO			AF		
AOUT2R	Audio output from scart 2, right							IO			AF		
APH	Audio playback head						AL						
ARH	Audio record head						AL						
BLANKING	Blanking pulse RGB loopthrough							IO					
BLUE	Blue signal between scart 1/2							IO					
CAP	Capstan control voltage			DE									
CKDET	Colour system information			DE		VS							
CLKD1	Serial bus clock			DE	DC								
CREV	Capstan reverse			DE									
CROT	Colour rotation on/off			DE		VS							

Signal	Description	Application											
CSCP	Colour phase switching for LP feature mode			DE		VS							
CSI	Colour system information			DE					SE				
CSP	Chrominance secam playback					VS			SE				
CSR	Chrominance secam record		HA						SE				
CSW	8V/14V switching for capstan motor	PS		DE									
CSYNC/1/2	Composite sync pulse		HA	DE		VS			SE			OS	
CTL1/2	Control track signal			DE			AL						
DATD1/2	Serial bus data			DE	DC								
DEC	Audio switching voltage							IO					
ENVC	Envelope comparator signal		HA	DE									
FFP	Feature frame pulse			DE		VS							
FG	Capstan tacho pulse			DE									
FGD	Capstan tacho pulse digital			DE									
FMAP	FM audio playback		HA								AF		
FMAR	FM audio record		HA								AF		
FMPV	FM video playback		HA			VS			SE				
FMRV	FM video record		HA			VS							
FOME	Follow Me (video signals equal)			DE								OS	
FTA	Threading tacho			DE									
FTAD	Threading tacho digital			DE									
GNDA	Ground analog							IO		FV			QNIC
GNDA1/A2	Ground analog QNIC												QNIC
GNDAF	Ground analog AF										AF		
GNDAIO	Ground analog IO							IO					
GNDAL	Ground analog AL						AL						
GNDD	Ground digital			DE				IO			AF		QNIC
GNDEO	Ground erase oscillator						AL						
GNDM	Ground capstan motor			DE									
GNDVS	Ground signal electronics										AF		
GNDVSIO	Ground analog VS, IO							IO					
GREEN	Green signal between scart1/2							IO					
HEHI	Heater for displaytube high	PS			DC								
HELO	Heater for displaytube low	PS			DC								
HEST	Heater voltage control signal				DC								
HP2	Head pulse audio		HA	DE							AF		
I/R	Deck switch / Record protection			DE									
ILED	LED-tower supply			DE									
INIT	Deck switch			DE									
IPOR	Inverse power on reset			DE	DC								
IRAF	Inverse record FM-audio		HA	DE									
IREV	Dubbing oscillator on/off			DE		VS	AL						
ISTBY	Inverse stand by	PS			DC								
ISWS	Video-FM mute			DE		VS							
IWIND	Control pulse amplification low			DE									
LH1/2/C	Long play heads		HA										
MEH1/2	Main erase head						AL						
MON	Monitor loop through scart 1/2							IO					
MOT0-3	Head motor Control lines			DE									
MTA	Audio mute			DE			AL						
NC	Not connected			DE									
OCLK	OSD-bus clock				DC							OS	
OCS	OSD chip select				DC							OS	
ODAT	OSD-bus data				DC							OS	
OFP	Frame pulse			DE								OS	

Signal	Description	Application											
PBV	Playback			DE					SE				
PG/FG	Head wheel position/-speed			DE									
POS	Position pulse headwheel			DE									
PSS	PAL or secam-L				DC					FV			
RECP	Record protection			DE									
RED	Red signal between scart 1/2							IO					
REEL	Head wheel control			DE									
SB1	Secam band 1				DC					FV			
SCL	IIC bus clock							IO		FV	AF	OS	QNIC
SCL2	Serial bus clock			DE		VS							
SDA	IIC bus data							IO		FV	AF	OS	QNIC
SDA2	Serial bus data			DE		VS							
SFS	Sound filter switch				DC					FV			
SH1/2/C	Standard play heads		HA										
SSIF	Second sound interfrequency									FV			QNIC
SWIN	Head switching pulse		HA	DE									
SYNC	Control track pulse			DE									
TAE	Tape end detection			DE									
TAS	Tape start detection			DE									
THIO	Threading motor in/out			DE									
TMO	Threading motor on/off			DE									
TMO1/2	Threading motor connection			DE									
TRIA/ALI	Tracking information audio / Audio level indication			DE							AF		
TRIV	Tracking information video		HA	DE									
VBS	Video input					VS		IO				OS	
VFR	Video from front connector							IO					
VFV	Video from frontend					VS		IO		FV		OS	
VIN1	Video input scart 1							IO					
VIN2	Video input scart 2							IO					
VISS	Control sync pulse inversion			DE									
VMOD	Video to the modulator							IO		FV			
VOUT	Video from OSD part							IO				OS	
VREC	Video record from I/O					VS			SE			OS	
VREF	Reference voltage								SE				
VSB	Video from signal electronics					VS						OS	
W/R	Control track write/read			DE									
WTL	Wind tacho left			DE									
WTLD	Wind tacho left digital			DE									
WTR	Wind tacho right			DE									
WTRD	Wind tacho right digital			DE									

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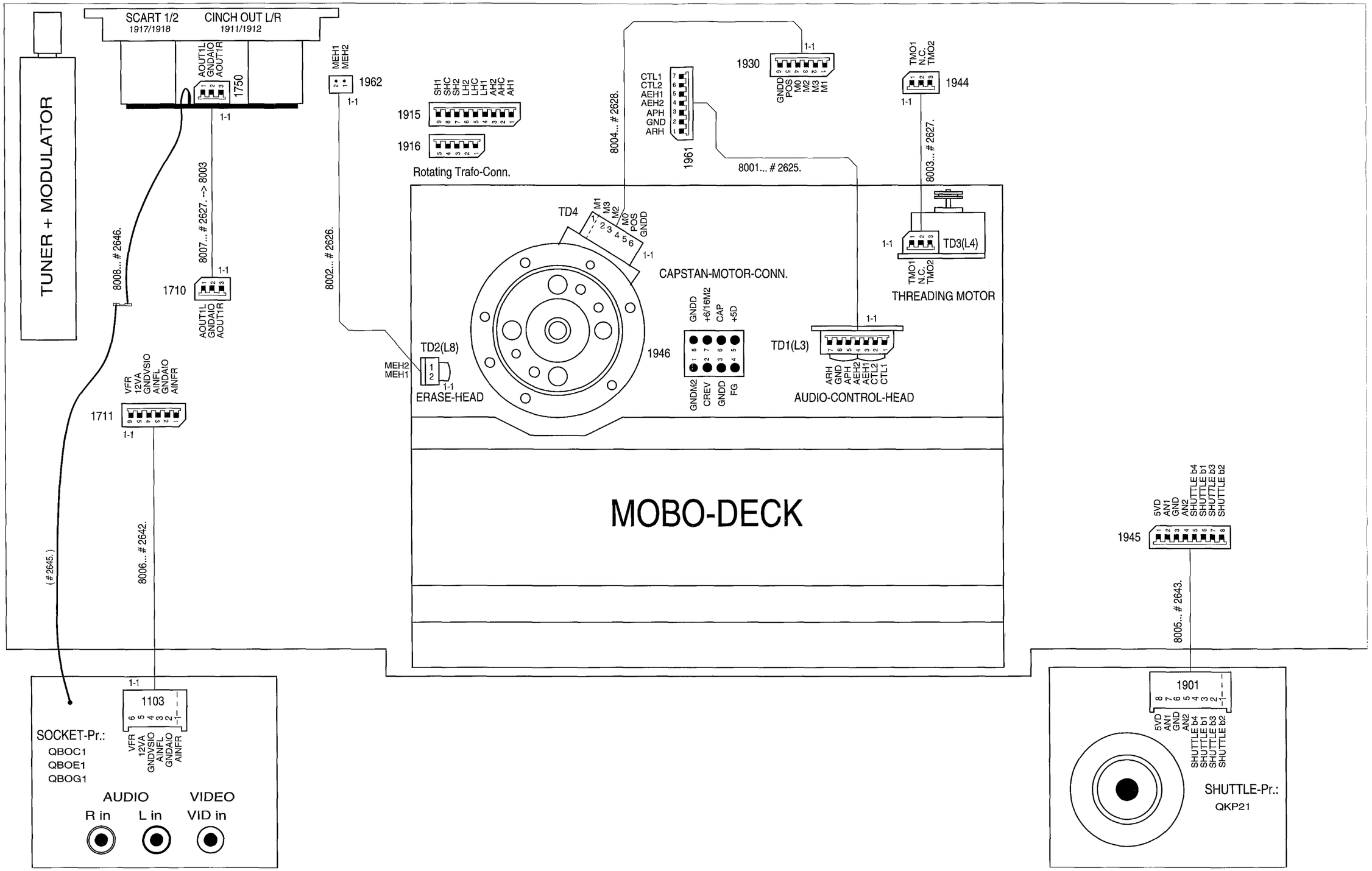
HA Head Amplifier page 3-15
DE Deck Electronics . page 3-16
DC Display Control . page 3-17
VS . Video Signal Processing page 3-18
AL . Audio Linear . .... page 3-18
IO .. In/Out ... . page 3-19
SE .. Secam Processing page 3-20
FV Frontend . ... page 3-21
AF Audio Processing . page 3-22
OS On Screen Display page 3-23
QNIC Nicam Board . page 3-25

Wiring Diagram



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Block Diagram Video

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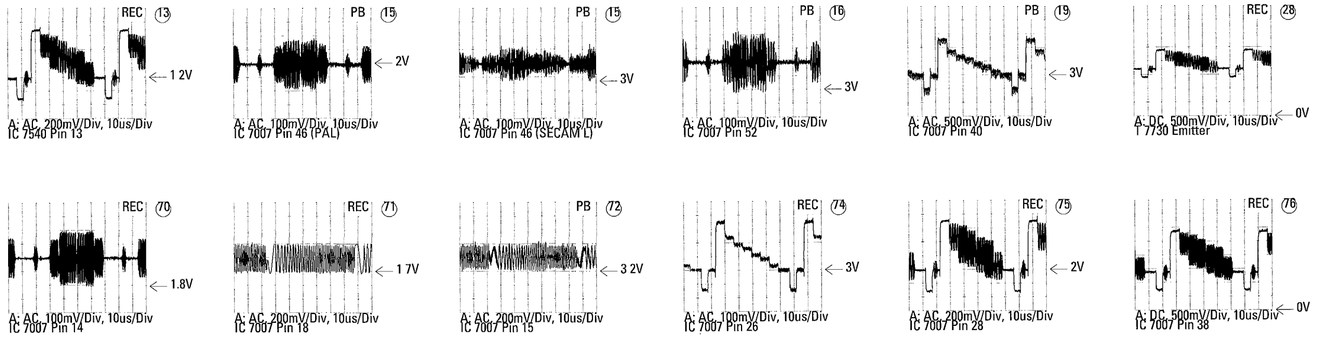

Interconnections:

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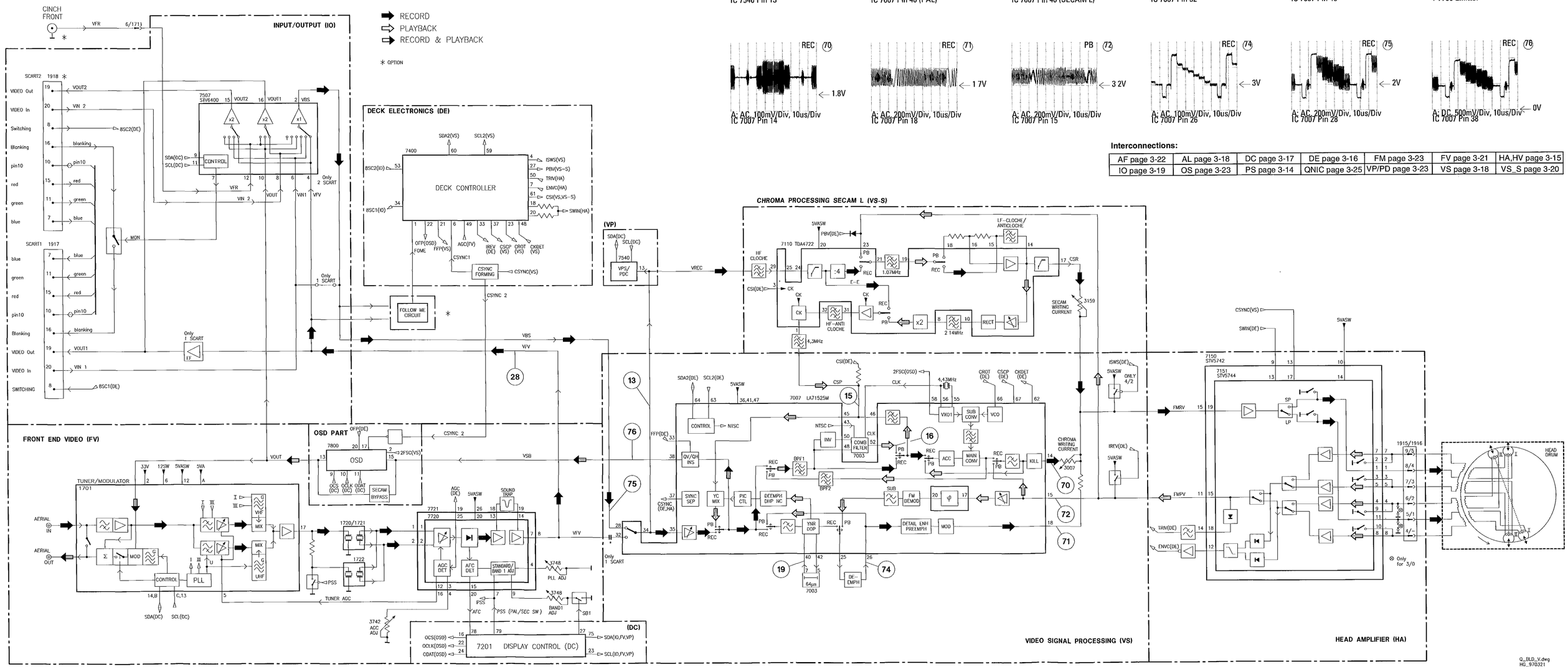
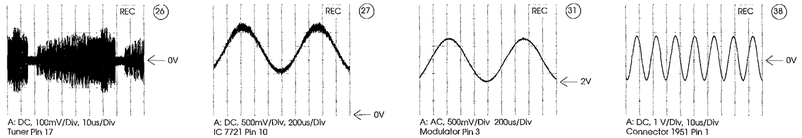
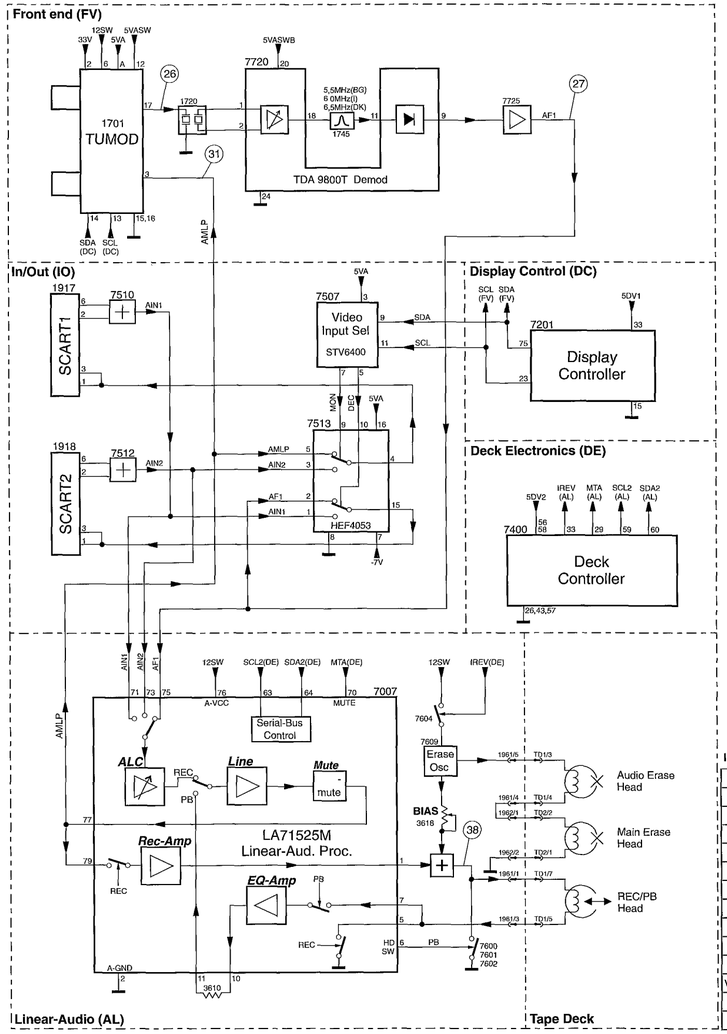


Block Diagram Audio Mono





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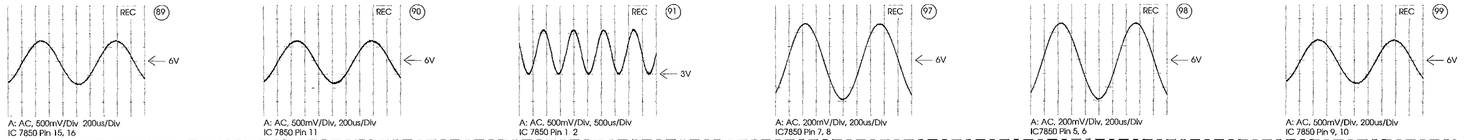
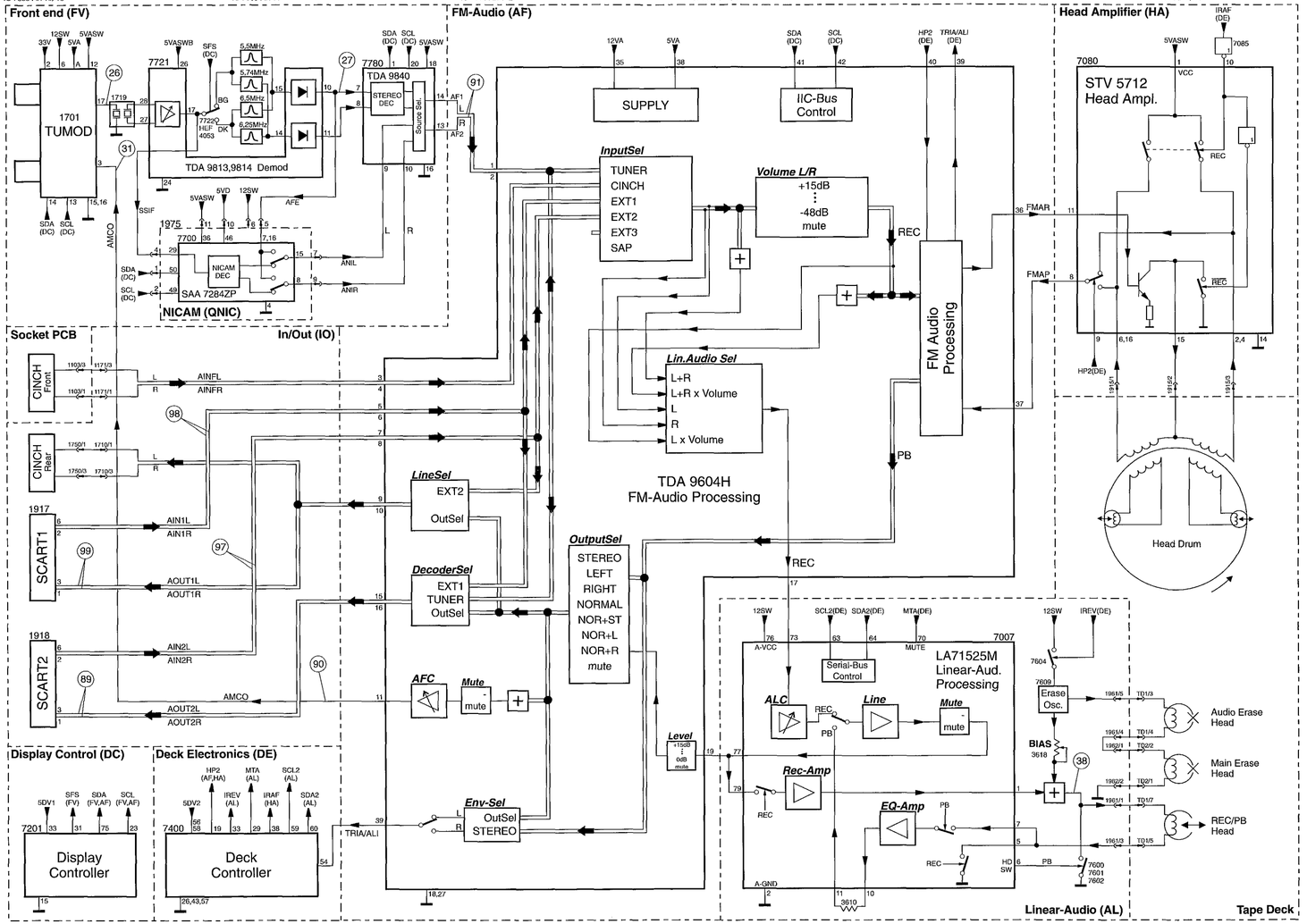
Block Diagram Audio Stereo





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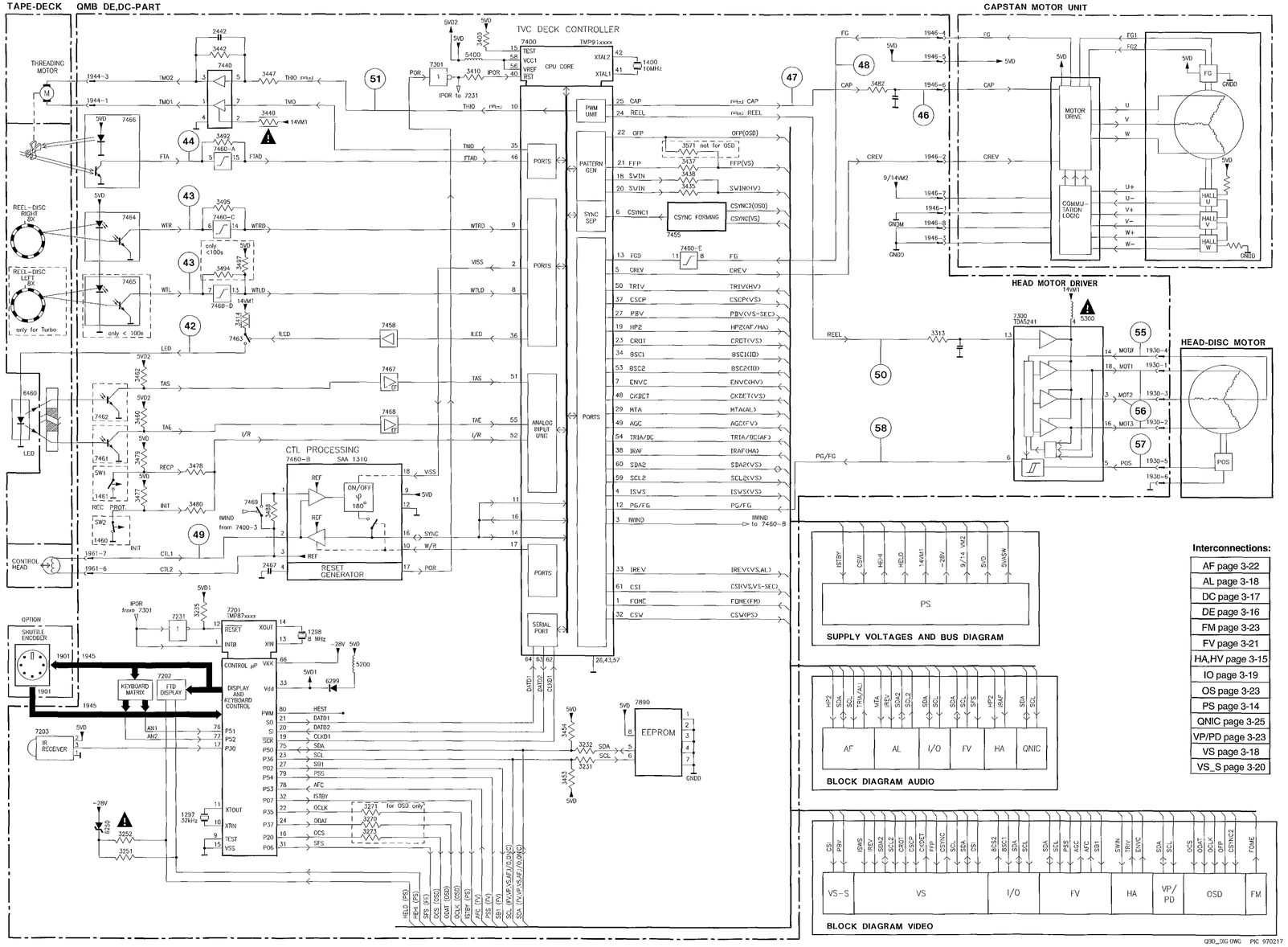
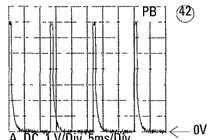
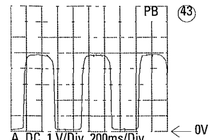
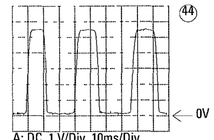
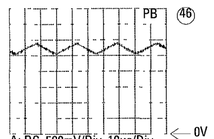
Block Diagram Digital

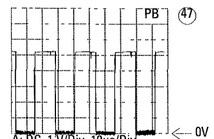


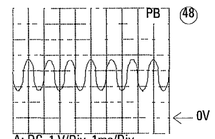


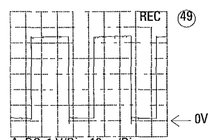


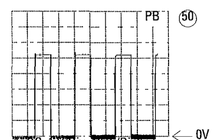


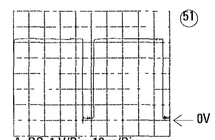


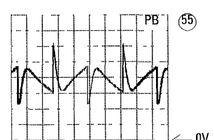


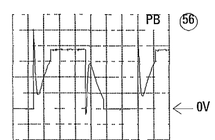


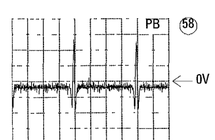












Supply Voltages and Bus Diagram

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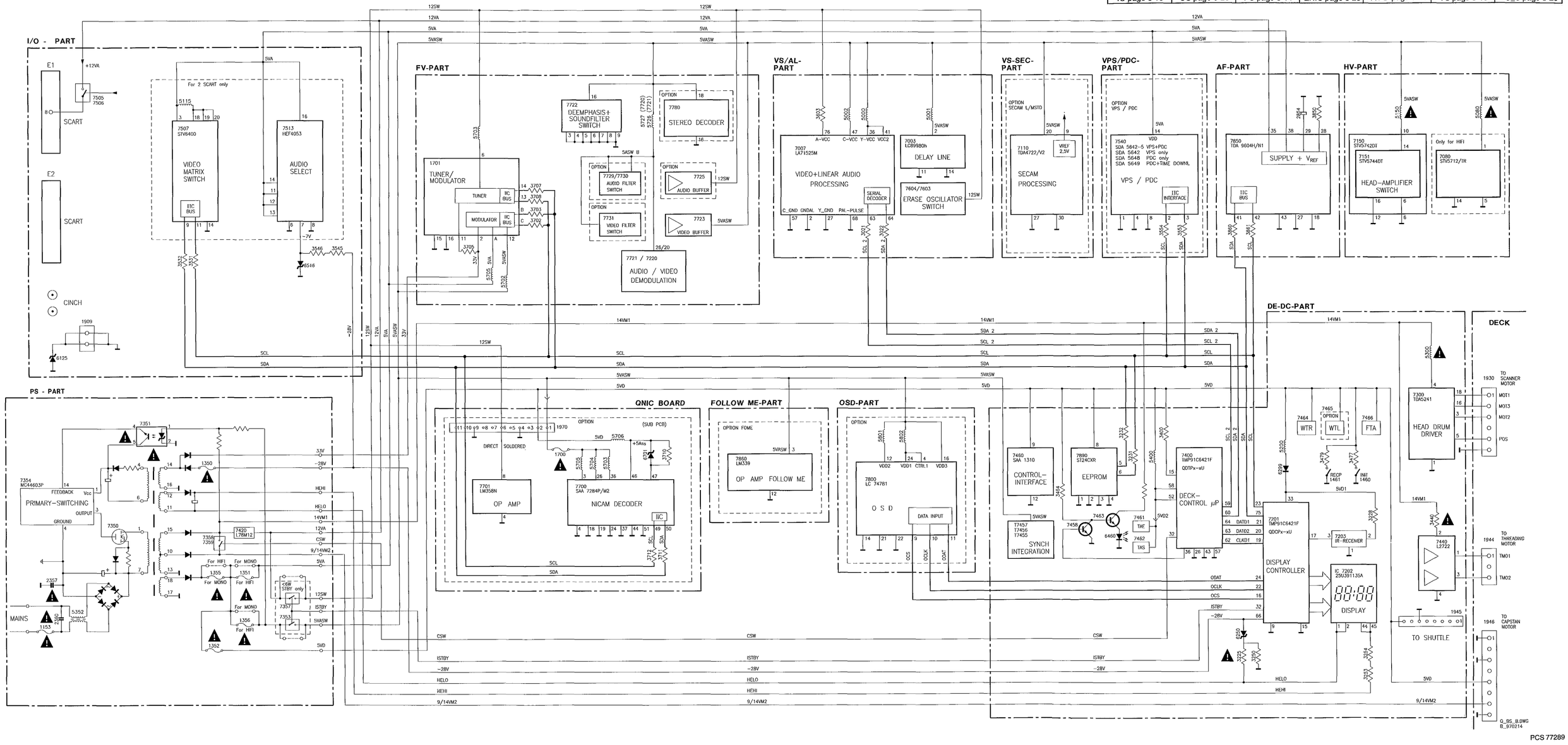

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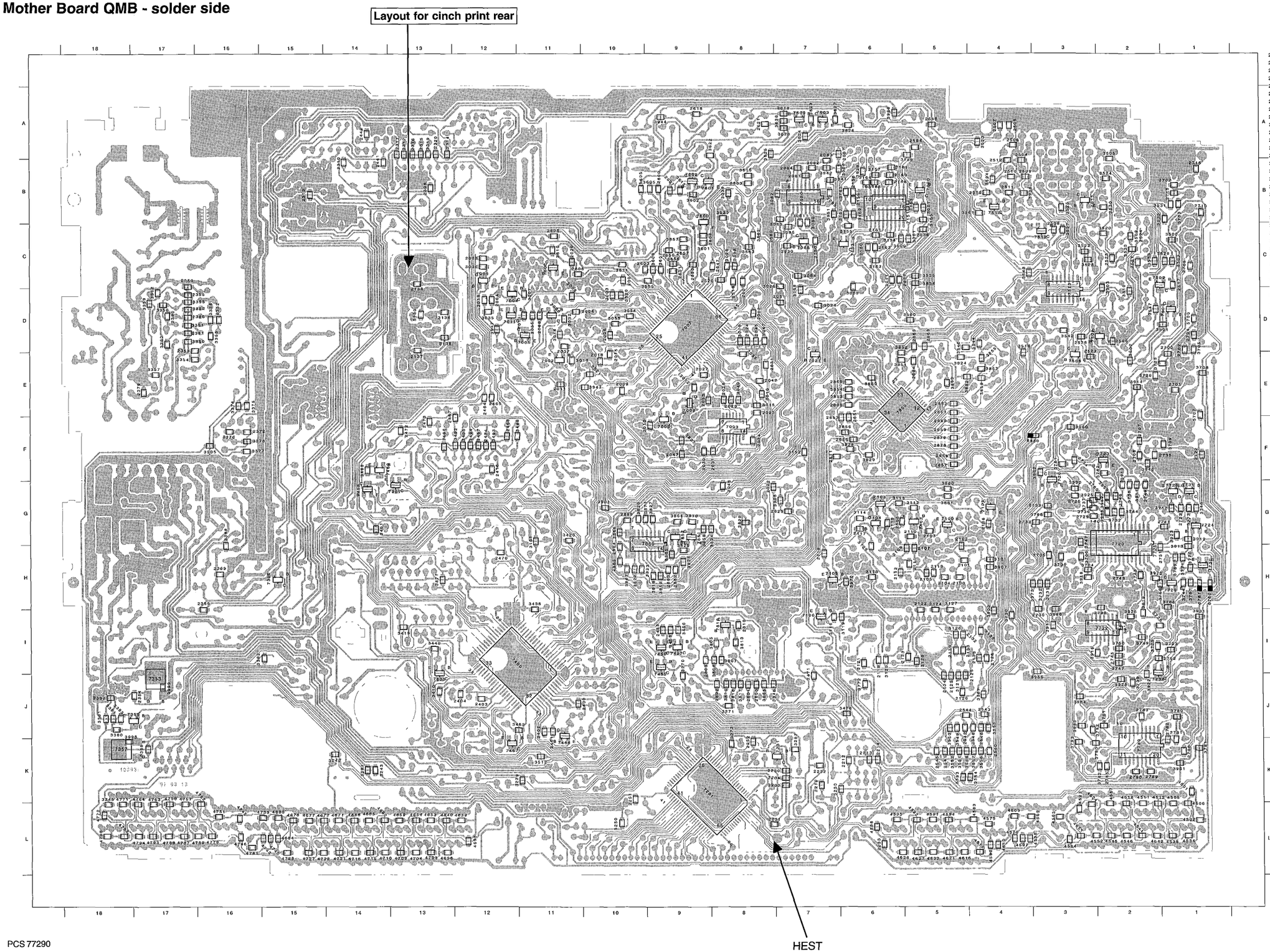
Mother Board QMB - solder side



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2003	D 10	2350	C 17	2794	D 1	3359	D 17	3723	I 1	3981	K 1	7000	C 11
2004	D 11	2352	D 16	2795	F 2	3360	D 17	3725	E 1	3982	F 3	7001	D 11
2006	D 10	2353	D 17	2800	J 8	3362	D 17	3726	E 2	3985	J 8	7002	E 11
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2013	D 11	2369	H 16	2811	F 7	3378	F 16	3735	G 2	3973	H 3	7007	D 9
2015	E 10	2372	F 16	2829	G 7	3380	J 18	3736	G 3	3984	J 3	7008	E 9
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2018	D 12	2380	D 17	2832	C 6	3382	I 15	3739	J 2	3986	I 3	7011	D 12
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2104	H 5	2523	E 3	3028	C 8	3525	B 3	3823	H 10	4598	L 4	7512	C 3
2105	H 5	2524	C 2	3029	B 8	3526	C 3	3824	G 8	4609	L 4	7513	D 3
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2108	G 6	2527	C 2	3035	D 12	3530	C 2	3827	G 9	4616	L 5	7602	B 9
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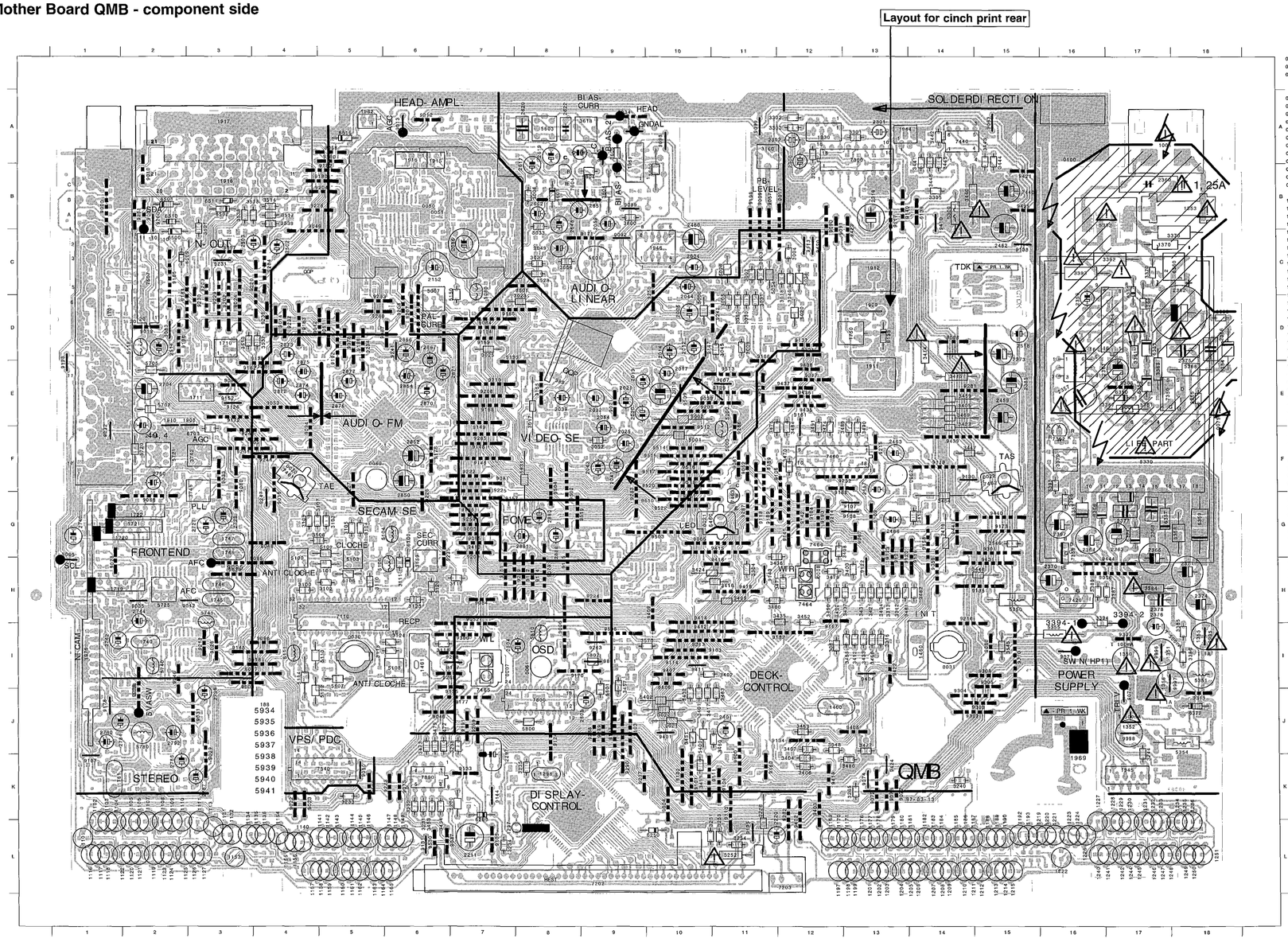
Mother Board QMB - component side



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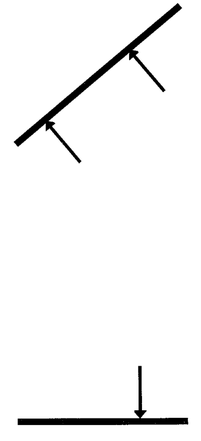
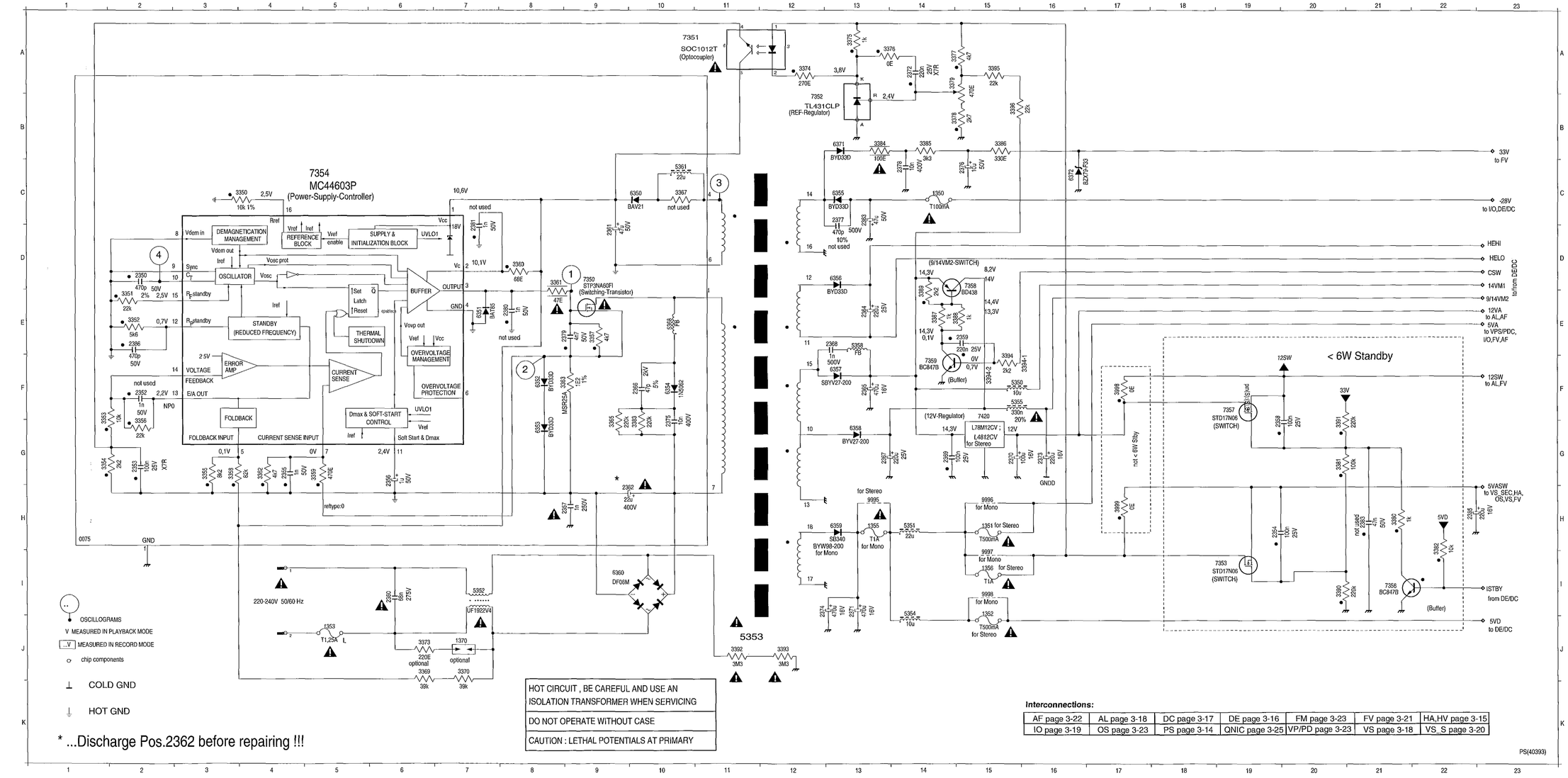
Make sure that the components in these areas are aligned correctly !!! (Danger of collision with deck)



3-14

Power Supply (PS)



Interconnections:

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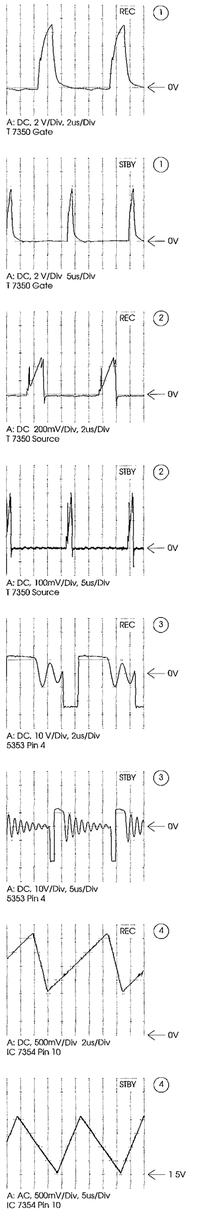
IO page 3-19	OS page 3-23	PS page 3-14	QNIC page 3-25	VP/PD page 3-23	VS page 3-18	VS_S page 3-20



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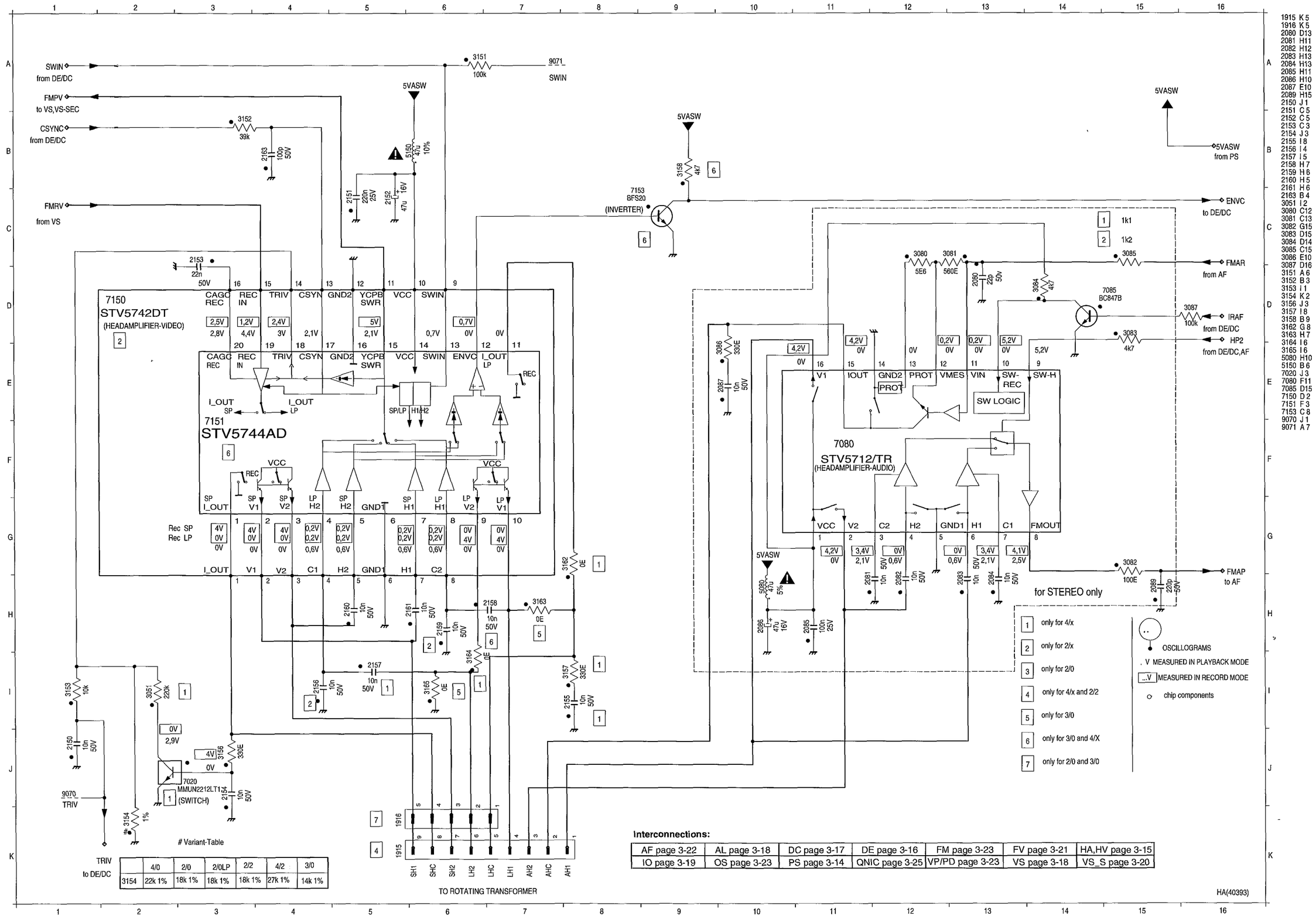

Interconnections:

AF page 3-22	AL page 3-18	DC page 3-17	DE page 3-16	FM page 3-23	FV page 3-21	HA,HV page 3-15
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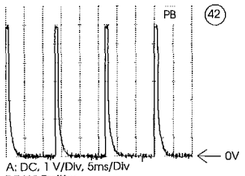
HA(40393)

3-16

Deck Electronics (DE)



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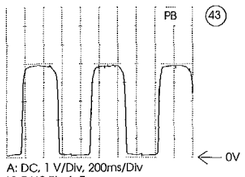
T 7463 Emitter



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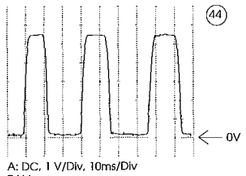
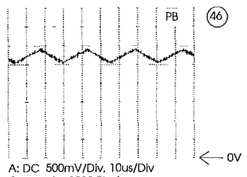
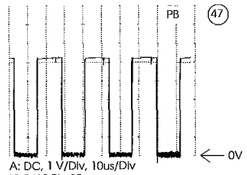
IC 7460 Pin 6, 7



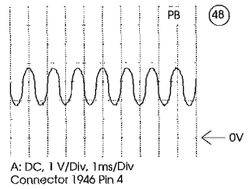
A: DC, 1 V/Div, 10ms/Div
7466



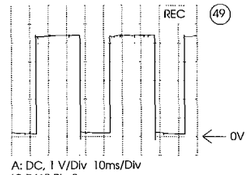
A: DC 500mV/Div, 10us/Div
Connector 1930 Pin 6



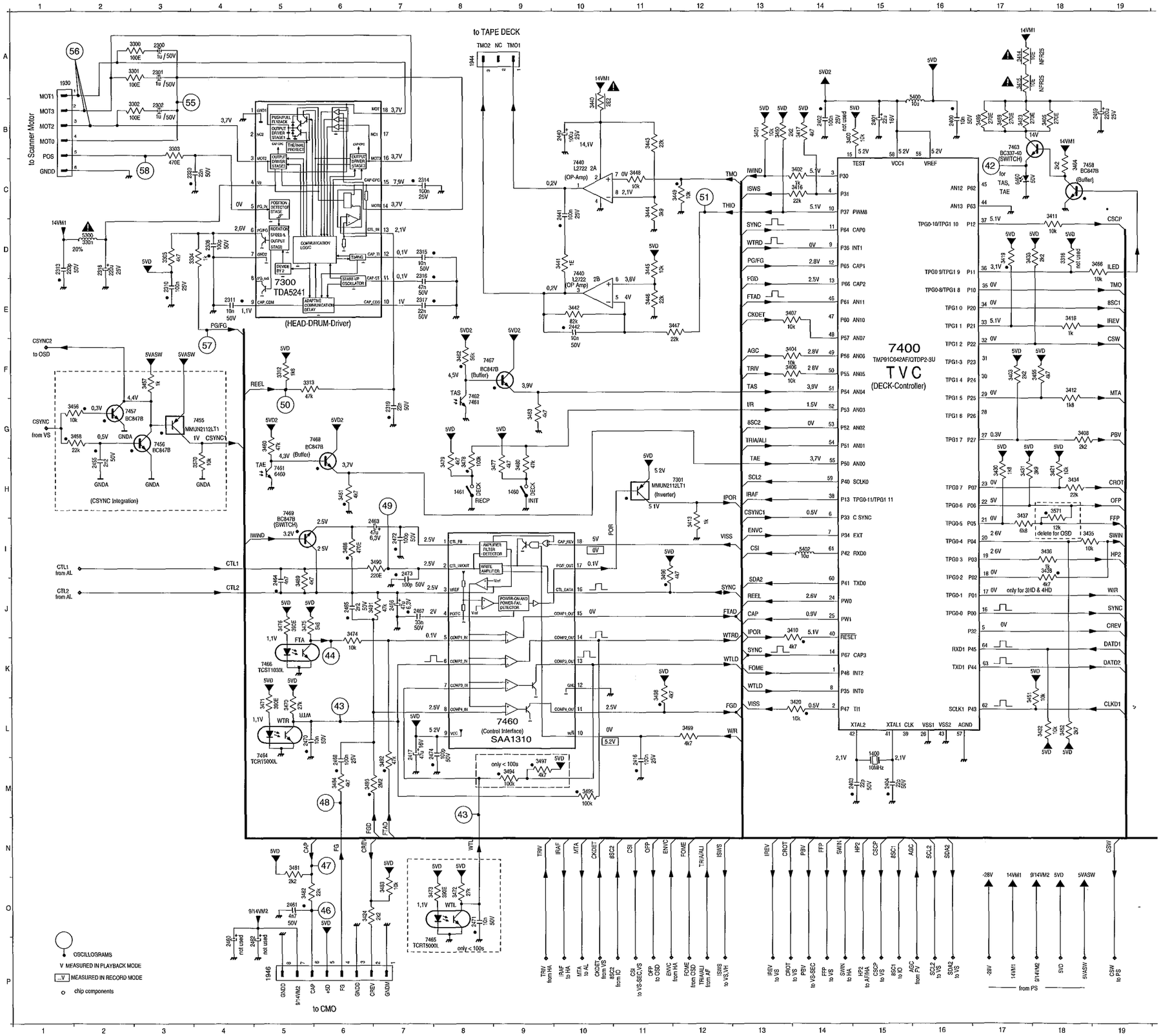
A: DC, 1 V/Div, 10us/Div
IC 7400 Pin 25



A: DC, 1 V/Div, 1ms/Div
Connector 1946 Pin 4

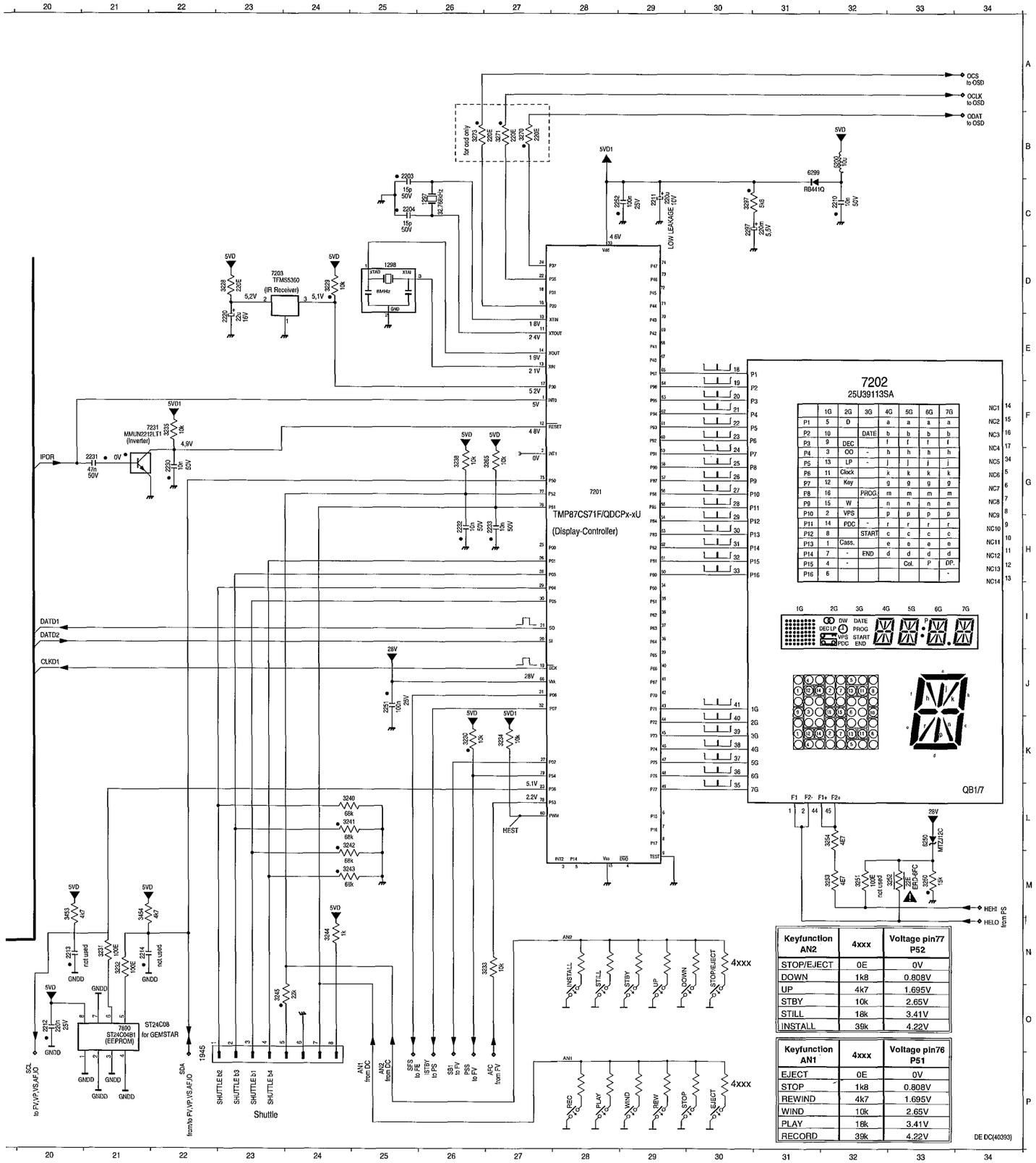


A: DC, 1 V/Div 10ms/Div
IC 7460 Pin 2



PCS 77294

Display Control (DC)



Keyfunction AN2	4xxx	Voltage pin77 P52
STOP/EJECT	0E	0V
DOWN	1k8	0.808V
UP	4k7	1.695V
STBY	10k	2.65V
STILL	18k	3.41V
INSTALL	39k	4.22V

Keyfunction AN1	4xxx	Voltage pin76 P51
EJECT	0E	0V
STOP	1k8	0.808V
REWIND	4k7	1.695V
WIND	10k	2.65V
PLAY	18k	3.41V
RECORD	39k	4.22V

1297 C26
1298 D25
1400 L15
1460 H 9
1461 H 8
1930 A 2
1944 A 8
1945 O22
1946 P 5
2203 B25
2204 C25
2210 C32
2211 C29
2212 O20
2213 N20
2214 N21
2220 E23
2230 G22
2231 G21
2232 H26
2233 H27
2251 J25
2252 C29
2297 C30
2300 A 3
2301 A 3
2302 B 3
2308 D 4
2310 E 3
2311 E 4
2313 D 1
2314 C 7
2315 D 7
2316 D 7
2317 E 7
2318 D 2
2319 G 7
2320 C 4
2400 B16
2401 B15
2402 B14
2403 M15
2404 M15
2416 M11
2417 L 7
2440 B10
2441 C10
2442 E10
2455 H 2
2459 B19
2460 P 4
2461 O 5
2462 P 5
2463 I 7
2464 J 5
2465 J 6
2466 J 7
2467 J 7
2468 M 6
2470 L 5
2471 O 8
2472 I 7
2473 I 7
2474 L 8
3228 D23
3229 D24
3230 K26
3231 N21
3232 N21
3233 N27
3234 K27
3235 F22
3238 G26
3240 L24
3241 L24
3242 L24
3243 M24
3244 N24
3245 O23
3250 M33
3251 M32
3252 M33
3253 M32
3254 L32
3265 G27
3270 B27
3271 B27
3273 B26
3297 C30
3300 A 3
3301 A 3
3302 B 3
3303 B 3
3304 D 4
3305 D 3
3312 F 5
3313 F 5
3316 D16
3400 B14
3401 B13
3402 C14
3403 F17
3404 F14
3405 B18
3406 F14
3407 E14
3408 G18
3410 J14
3411 C18
3412 F18
3413 I12
3414 A17
3415 A17
3416 C14
3417 B14
3418 E18
3419 D17
3420 L14
3421 H18
3423 B17
3424 O 6
3430 H17
3431 H17
3432 L18
3433 D17
3434 H18
3435 I18
3436 I18
3437 H17
3438 I18
3440 B10
3441 D10
3442 E10
3443 B11
3444 C11
3445 D11
3446 E11
3447 E12
3448 C11
3449 C12
3450 B13
3451 K17
3452 L18
3453 M20
3454 M21
3455 F18
3456 G 2
3457 F 3
3458 G 2
3459 B17
3460 G 5
3461 H 6
3462 F 8
3463 G 9
3464 C18
3466 D19
3469 B17
3470 L 5
3471 L 5
3472 O 8
3473 O 7
3474 J 6
3475 J 5
3476 J 5
3477 H 9
3478 H 8
3479 H 8
3480 H 9
3481 N 5
3482 O 5
3483 O 7
3484 M 6
3488 I 6
3489 J 5
3490 I 7
3491 J 7
3492 M 7
3493 M 6
3494 M 9
3495 M10
3496 I11
3497 M 9
3498 K11
3499 L12
3570 H 4
3571 H18
5200 B32
5300 D 2
5400 B16
5402 I14
6250 L33
6299 B31
6460 C17
7201 G28
7202 F32
7203 D23
7231 F22
7300 E 5
7301 H12
7400 F15
7440 C10
7440 D10
7455 G 4
7456 G 3
7457 G 2
7458 C19
7460 L 9
7461 H 5
7462 F 8
7463 B17
7464 L 5
7465 P 7
7466 K 5
7467 F 8
7468 G 5
7469 H 5
7890 O21

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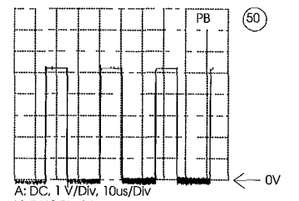
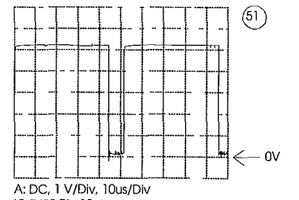
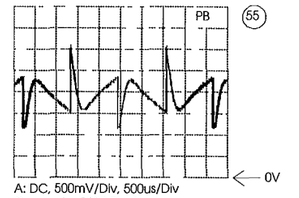


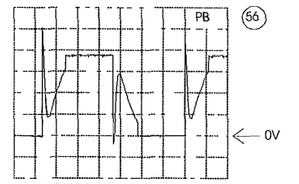
A: DC, 1 V/Div, 10us/Div
IC 7400 Pin 24



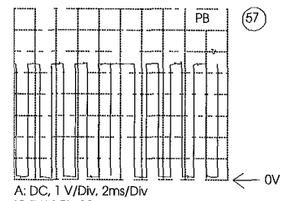
A: DC, 1 V/Div, 10us/Div
IC 7400 Pin 10



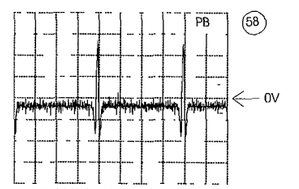
A: DC, 500mV/Div, 500us/Div
Connector 1930 Pin 4



A: DC, 2 V/Div, 1ms/Div
Connector 1930 Pin 1, 2, 3



A: DC, 1 V/Div, 2ms/Div
IC 7400 Pin 12



A: DC, 2 V/Div, 10ms/Div
Connector 1930 Pin 5

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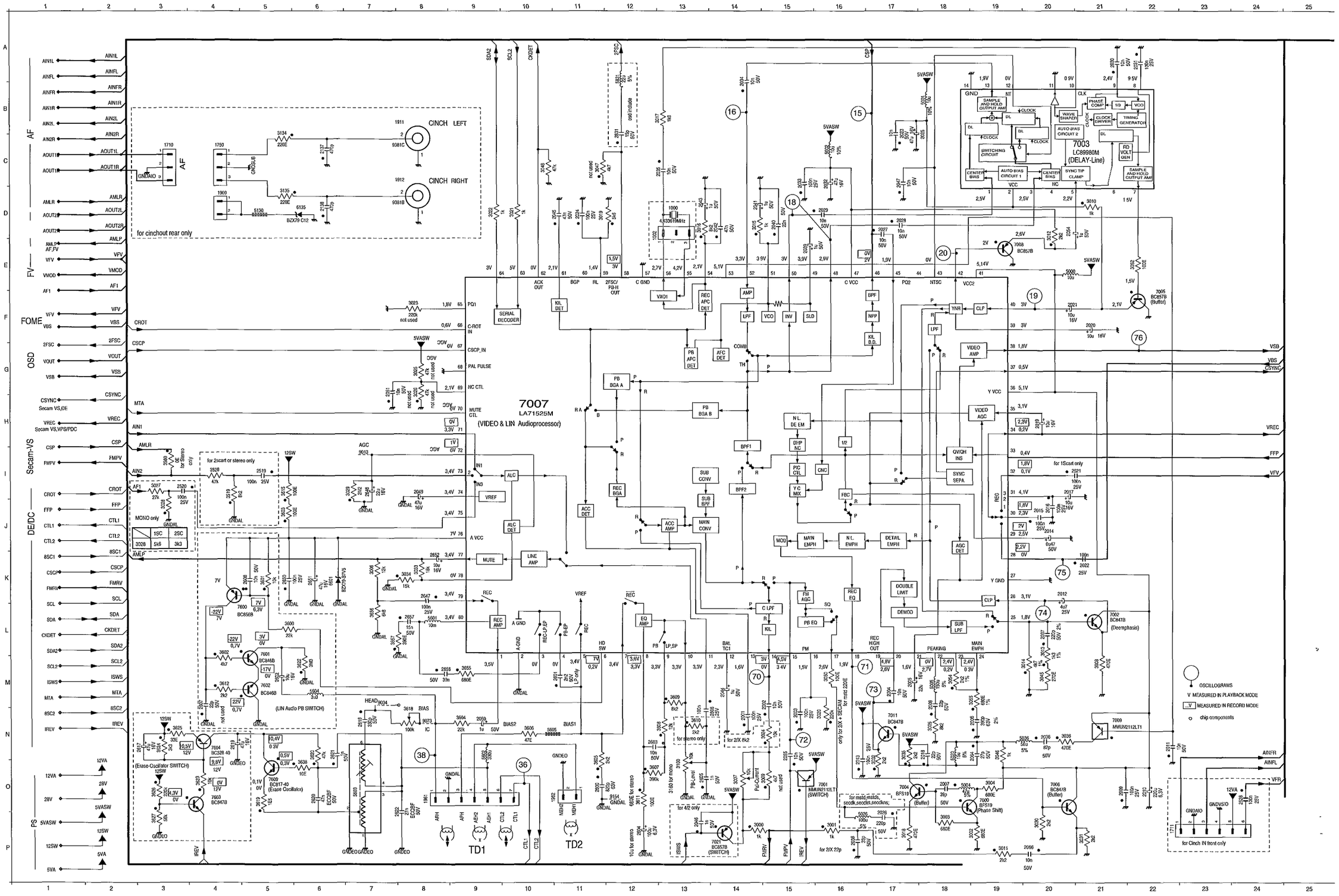
Video Signal Processing (VS), Audio Linear (AL)



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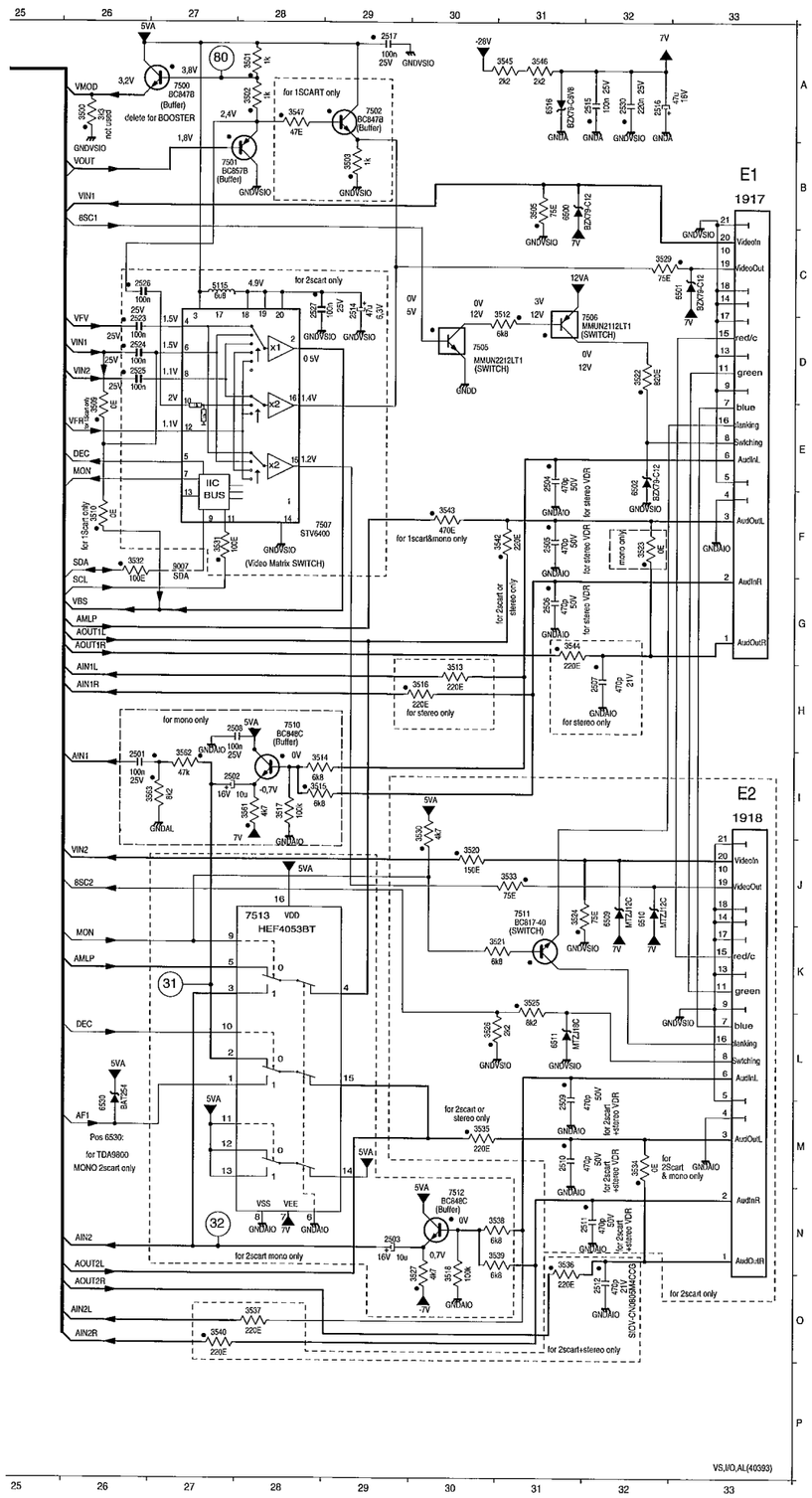
In/Out (I/O)



1000 D13 1002 E12 1710 C3 1711 P22 1750 C4 1909 O4 1911 B8 1912 C8 1917 B33 1918 I33 1961 O8 1962 O10 2001 N14 2002 M15 2003 N15 2004 M17 2005 M17 2006 N19 2007 O18 2008 M18 2009 O21 2010 O22 2011 N22 2012 K20 2013 N16 2014 J20 2015 J20 2016 J20 2017 I20 2018 N18 2019 H20 2020 F21 2021 F20 2022 K21 2023 B17 2024 D11 2025 B18 2026 P17 2027 D17 2028 D17 2029 D16 2030 A21 2031 A22 2032 C16 2033 C15 2034 A14 2035 C13 2036 N20 2037 L20 2038 P16 2039 E15 2040 D15 2041 D14 2042 D14 2043 D13 2044 M14 2045 D11 2046 P13 2047 C17 2049 I8 2051 G7 2054 D20 2055 N15 2059 N9 2064 N19 2066 P20 2137 C6 2138 D6 2501 I26 2502 I27 2503 N29 2504 E31 2505 F31 2506 G31 2507 H32 2508 H28 2509 M31 2510 M31 2511 N32 2512 O32 2514 C29 2515 A32 2516 A32 2517 A29 2519 I5 2520 I3 2521 I21 2523 D26 2524 D26 2525 D26 2526 C26 2527 C28 2528 O24 2530 A32 2600 O11 2601 M11 2602 M5 2603 N12 2604 P12 2605 O13 2606 N14 2607 M4 2608 K5 2617 N3 2618 N7 2619 N4 2620 O6 2621 N6 2622 O8 2647 K8 2648 I7 2650 K5 2651 K6 2652 K8 2656 M8 2657 L8 2831 B12 3000 P14 3001 P16 3002 P19 3003 P18 3004 O19 3005 N18 3006 K7 3007 O14 3008 M21 3009 O15 3010 D21 3011 P19 3012 D20 3013 L20 3014 M20 3015 D14 3016 D13 3017 B13 3018 P17 3019 D11 3020 N16 3021 D10 3022 D9

3023 F8 3024 N15 3025 G8 3026 G8 3027 I3 3028 J3 3029 I7 3030 P20 3031 P21 3032 N17 3033 K8 3034 K8 3035 N17 3036 N20 3045 M20 3046 N19 3047 C11 3048 C10 3050 M16 3052 E22 3054 M18 3055 M19 3134 C5 3135 D5 3160 O13 3500 A26 3501 A28 3502 A28 3503 B29 3505 B31 3509 F26 3510 F26 3512 D31 3513 H30 3514 I28 3515 I28 3516 H30 3517 I28 3518 N30 3519 I4 3520 J30 3521 K31 3522 D32 3523 F32 3524 J31 3525 K31 3526 L30 3527 N30 3528 I4 3529 C32 3530 I30 3531 F27 3532 F26 3533 J31 3534 M32 3535 M30 3536 N31 3537 O28 3538 N31 3539 N31 3540 O27 3542 F31 3543 F30 3544 G31 3545 A31 3546 A31 3547 A28 3560 I3 3561 I28 3562 I27 3563 I27 3600 L5 3601 K5 3602 L4 3603 J5 3604 N9 3605 N11 3606 N10 3607 O12 3608 N13 3609 M13 3510 N13 3611 O12 3612 M4 3615 I5 3618 N8 3619 O5 3620 N6 3622 M6 3623 O4 3624 N3 3625 N3 3626 O3 3627 P3 3638 O6 3655 M9 3656 L7 3657 L7 5000 E20 5001 B18 5002 C16 5004 O18 5005 M18 5020 N18 5026 P16 5036 N20 5115 C27 5130 D5 5601 L8 5602 N9 5603 O7 5604 M6 5605 N10 5831 A12 6135 D6 6500 B31 6501 C33 6502 E32 6509 J32 6510 J32 6511 L31 6516 A31 6530 M26 6601 K6 7000 O19 7001 O16 7002 L21 7003 C20 7004 O17 7005 F22 7006 O20 7007 H10 7008 E19 7009 N21 7011 N17 7021 P14 7500 A27 7501 B27 7502 A29 7505 D30

7506 C31 7507 F29 7510 H28 7511 J31 7512 N30 7513 J28 7600 L5 7601 L5 7602 M5 7603 O4 7604 N4 7609 O5 9007 F27 9013 I7 9034 M7 9073 N8 9154 O12

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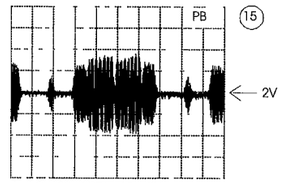
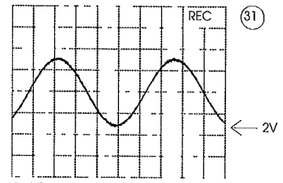
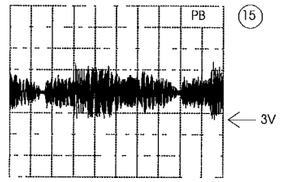


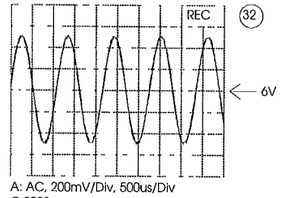
A: AC, 100mV/Div, 10us/Div
IC 7007 Pin 46 (PAL)



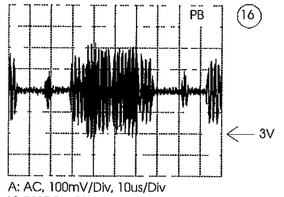
A: AC, 500mV/Div, 200us/Div
Modulator Pin 3



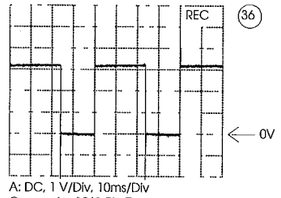
A: AC, 100mV/Div, 10us/Div
IC 7007 Pin 46 (SECAM L)



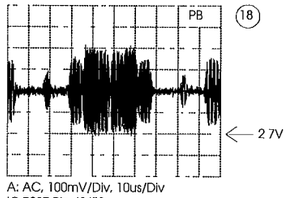
A: AC, 200mV/Div, 500us/Div
C 2503



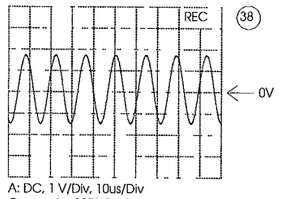
A: AC, 100mV/Div, 10us/Div
IC 7007 Pin 52



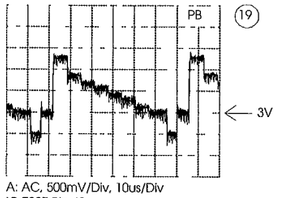
A: DC, 1 V/Div, 10ms/Div
Connector 1961 Pin 7



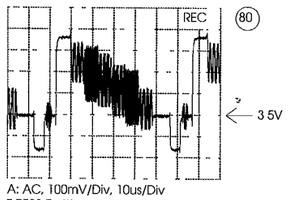
A: AC, 100mV/Div, 10us/Div
IC 7007 Pin 48/50



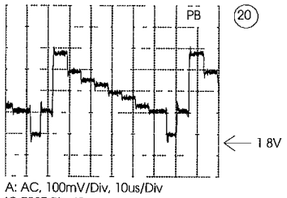
A: DC, 1 V/Div, 10us/Div
Connector 1951 Pin 1



A: AC, 500mV/Div, 10us/Div
IC 7007 Pin 40



A: AC, 100mV/Div, 10us/Div
T 7500 Emitter



A: AC, 100mV/Div, 10us/Div
IC 7007 Pin 42

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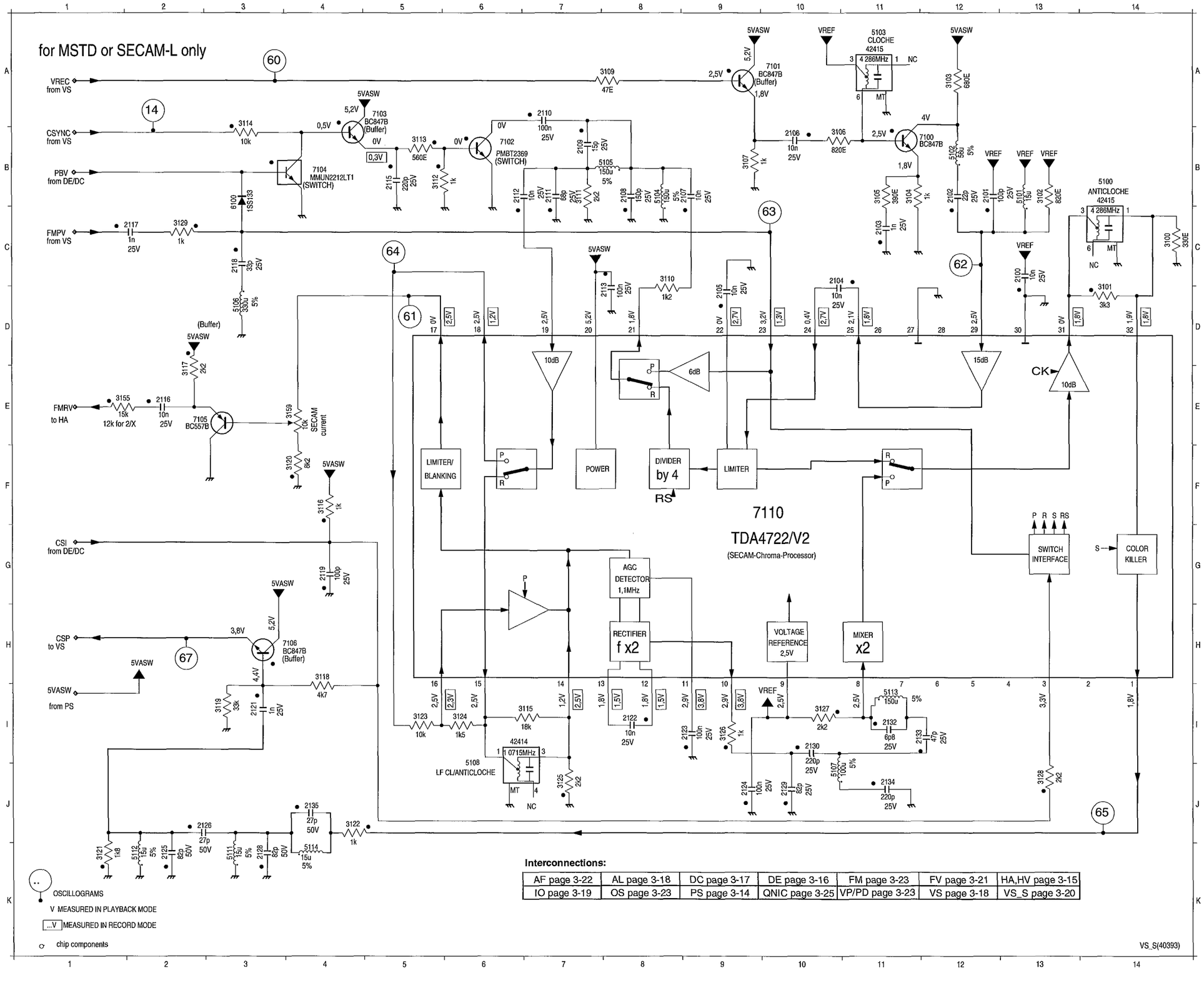
Video Signal Processing Secam (VS_S)



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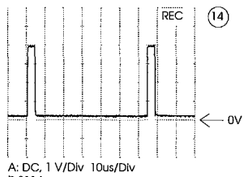
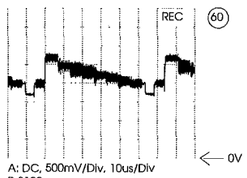
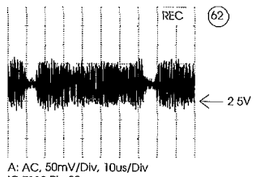


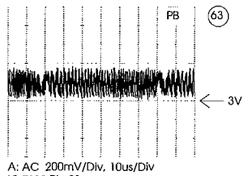
A: DC, 1 V/Div 10us/Div
R 3114



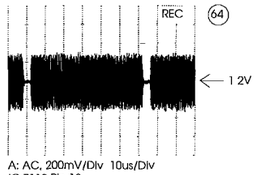
A: DC, 500mV/Div, 10us/Div
R 3109



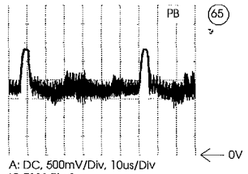
A: AC, 50mV/Div, 10us/Div
IC 7110 Pin 29



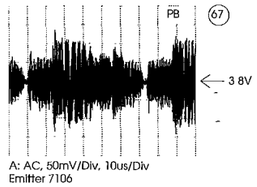
A: AC 200mV/Div, 10us/Div
IC 7110 Pin 23



A: AC, 200mV/Div 10us/Div
IC 7110 Pin 18

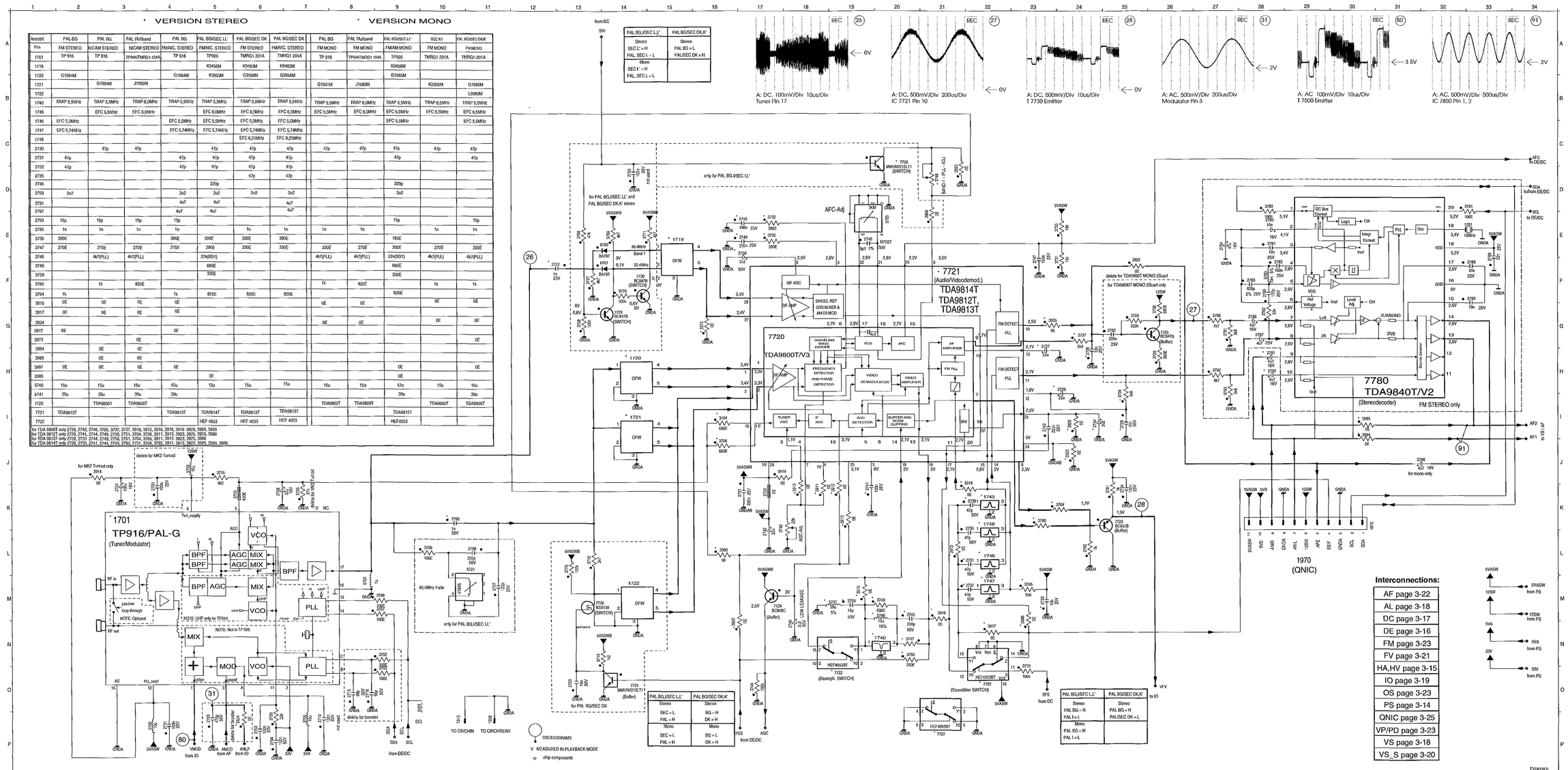


A: DC, 500mV/Div, 10us/Div
IC 7110 Pin 1



A: AC, 50mV/Div, 10us/Div
Emitter 7106

Frontend (FV)



Amtsbl.	PAL-BG	PAL BG	PAL I/Ulband	PAL BG	PAL BG/SEC LL'	PAL BG/SEC DK	PAL BG/SEC DK	PAL BG	PAL I/Ulband	PAL BG/SEC LL'	SCC K1	PAL BG/SEC-DK/K'
Pos	FM STEREO	NICAM STEREO	NICAM STEREO	FM/NIC. STEREO	FM/NIC. STEREO	FM STEREO	FM/NIC. STEREO	FM MONO	FM MONO	FM/AM MONO	FM MONO	FM MONO
1701	TP 916	TP 916	TP944/TMRG1-104A	TP 916	TP926	TMRG1 201A	TMRG1 201A	TP 916	TP944/TMRG1 104A	TP926	TMRG1 201A	TMRG1 201A
1719					K9456M	K9463M	K9463M			X9456M		
1720	G1984M			G1984M	K9953M	G3956M	G3956M			G1668M		
1721		G1984M	J1980M					G1661M	J1980M		K2955M	G1664M
1722												L8960M
1740	TRAP 5,5MHz	TRAP 5,5MHz	TRAP 6,0MHz	TRAP 5,5MHz	TRAP 5,5MHz	TRAP 5,5MHz	TRAP 5,5MHz	TRAP 5,5MHz	TRAP 6,0MHz	TRAP 5,5MHz	TRAP 6,5MHz	TRAP 5,5MHz
1745		EFC 5,5MHz	EFC 6,0MHz		EFC 6,0MHz	EFC 6,5MHz	EFC 6,5MHz	EFC 5,5MHz	EFC 6,0MHz	EFC 6,5MHz	EFC 6,5MHz	EFC 5,5MHz
1746	EFC 5,5MHz			EFC 5,5MHz	EFC 5,5MHz	EFC 5,5MHz	EFC 5,5MHz			EFC 5,5MHz		EFC 5,5MHz
1747	EFC 5,74MHz			EFC 5,74MHz	EFC 5,74MHz	EFC 5,74MHz	EFC 5,74MHz					
1748						EFC 6,25MHz	EFC 8,25MHz					
2730		47p	47p		47p	47p	47p	47p	47p	47p	47p	47p
2731	47p			47p	47p	47p	47p			47p		47p
2732	47p			47p	47p	47p	47p					
2735						47p	47p					
2745					220p					220p		
2750	2u2			2u2	2u2	2u2	2u2			2u2		
2791				4u7	4u7		4u7					
2792				4u7	4u7		4u7					
2793	15p	15p	15p	15p						15p		15p
2795	1n	1n	1n	1n		1n	1n	1n	1n		1n	1n
3735	390E			390E	390E	390E	390E			180E		
3747	270E	270E	270E	270E	390E	330E	330E	330E	270E	390E	270E	330E
3748		4k7(PLL)	4k7(FLL)		22k(BDI)			4k7(FLL)	4k7(FLL)	22k(BDI)	4k7(PLL)	4k7(PLL)
3749					680E					680E		
3759					330E					330E		
3760		1k	820E					1k	820E		1k	1k
3764	1k			1k	820E	820E	820E			820E		
3815	0E	0E	0E	0E				0E	0E		0E	0E
3917	0E	0E	0E	0E								
3924								0E	0E		0E	0E
3972	0E			0E								
3973			0E									0E
3984		0E	0E									
3985		0E	0E									
3987	0E	0E	0E	0E						0E		0E
3988					0E					0E		
5740	15u	15u	15u	15u	12u	15u	15u	15u	15u	12u	15u	15u
5741	39u	39u	39u	39u						39u		39u
7720		TDA9800T	TDA9800T					TDA9800T	TDA9800T		TDA8600T	TDA9800T
7721	TDA9813T			TDA9813T	TDA9814T	TDA9813T	TDA9813T			TDA9812T		
7722					HEF 4053	HEF 4053	HEF 4053			HEF4053		

for TDA 9800T only 2726, 2743, 2746, 3706, 3737, 3737, 3910, 3912, 3916, 3918, 3919 3826, 3969, 3990
for TDA 9812T only 2729, 2741, 2744, 2749, 2750, 2751, 3704, 3736, 3911, 3913, 3923, 3925, 3950, 7986
for TDA 9813T only 2728, 2733 2744, 2749, 2750, 2751, 3704, 3765, 3911, 3913 3923, 3925, 3986
for TDA 9814T only 2728, 2733, 2741, 2744, 2749, 2750, 2751, 3704, 3765, 3911, 3913, 3923, 3925, 3950, 3988.

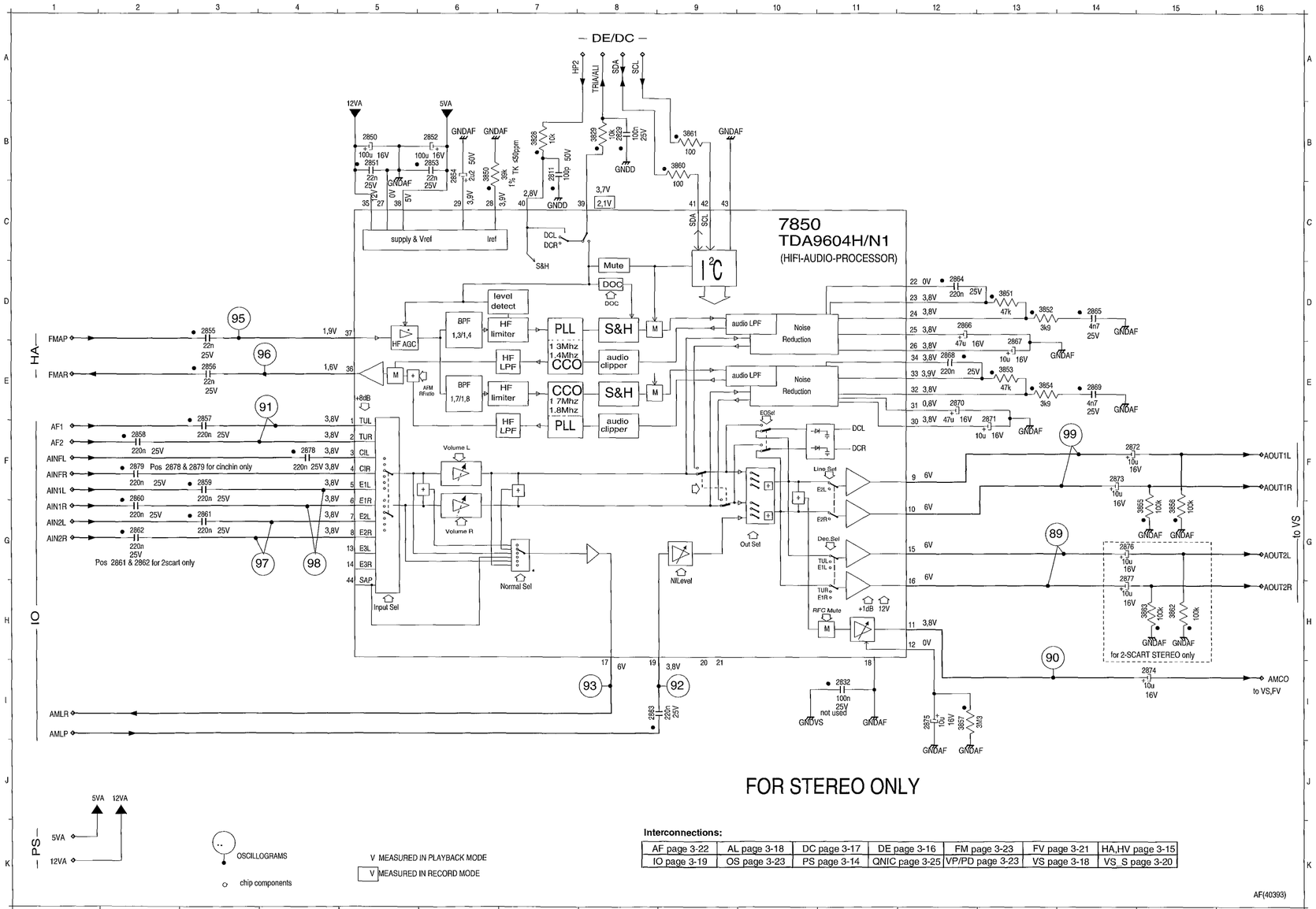
PAL BG,I/SEC LL'	PAL BG/SEC DK,K'
Stereo SEC L' = H PAL, SEC L = L	Stereo PAL BG = L PAL/SEC DK = H
Mono SEC L' = H PAL, SEC L = L	

PAL BG,I/SEC LL'	PAL BG/SEC DK,K'
Stereo SEC = L PAL = H	Stereo BG = H DK = H
Mono SEC = L PAL = H	Mono BG = L DK = H

PAL BG,I/SEC LL'	PAL BG/SEC DK,K'
Stereo PAL BG = H PAL I = L	Stereo PAL BG = H PAL/SEC DK = L
Mono PAL BG = H PAL I = L	

1701 K 3 1719 E15 1720 H14 1721 I14 1722 M14 1740 N19 1745 K22 1746 L22 1747 M22 1748 K23 1781 E33 1906 P11 1910 P10 1975 K30 2700 A 4 2701 P 4 2702 P 6 2704 K 3 2705 P 5 2708 L11 2707 M11 2708 K 6 2710 P 7 2715 O 6 2716 O 8 2722 F12 2723 O13 2726 H24 2727 G23 2728 H24 2729 I25 2730 K22 2731 L22 2732 M22 2733 M23 2734 K25 2735 K22 2740 N18 2741 K19 2742 L17 2743 I23 2744 I24 2745 M20 2746 E17 2747 P23 2748 E19 2749 E17 2750 E17 2751 K17 2752 G25 2753 I14 2780 E28 2781 E28 2782 F28 2783 F28 2784 E27 2785 F28 2786 G28 2787 G28 2788 E33 2789 F33 2790 F33 2791 H28 2792 H26 2793 M19 2794 P 6 2795 K10 2796 J31 3702 N 9 3703 O 9 3704 I16 3705 P 6 3706 J16 3708 M 9 3709 L10 3712 L13 3715 N13 3723 G25 3725 J 5 3726 K 7 3729 H26 3730 E24 3731 F24 3732 E17 3735 E17 3736 H25 3737 G24 3739 G26 3742 K17 3744 O17 3747 N20 3748 D21 3749 M20 3750 N20 3760 K23 3761 L24 3762 L24 3784 K24 3765 M23 3766 E13 3767 F13 3768 G13 3769 E14 3770 F14 3771 E14 3772 O23 3773 L13 3780 D28 3781 D33 3782 G28 3790 G27 3791 G27 3792 H27 3793 H27 3910 K18 3911 K18 3912 K19 3913 K19 3914 J 2 3915 M19 3916 M21 3917 N22 3918 J22 3919 J17 3922 F25 3923 J24 3924 P 5 3925 G23 3926 I24 3950 N16 3972 G16 3973 L21 3984 I30 3985 I30 3986 M23 3988 E21 3989 L16 3990 D21 5700 K 5 5702 P 4 5703 J 4 5705 P 7 5720 M 8 5721 L10 5725 E20 5726 K17 5740 M20 5741 M18 5780 F28 6760 E14 7720 G26 7721 F21 7722 O22 7723 O19 7722 P21 7723 K25 7724 M17 7725 G26 7726 C20 7728 M13 7729 G14 7730 F14 7731 O14 7780 H30 9005 O 9

Audio FM Processing (AF)



FOR STEREO ONLY

OSCILLOGRAMS

chip components

V MEASURED IN PLAYBACK MODE

V MEASURED IN RECORD MODE

Interconnections:

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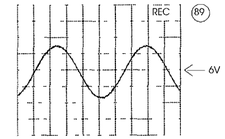
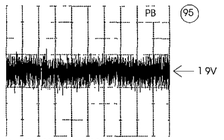
AF(40393)

2811 B 7
2829 B 8
2832 I 1
2850 B 5
2851 B 5
2852 B 6
2853 B 6
2854 B 6
2855 D 3
2856 E 3
2857 F 3
2858 F 2
2859 F 3
2860 G 2
2861 G 3
2862 G 2
2863 I 8
2864 D12
2865 D14
2866 D12
2867 D13
2868 E12
2869 E14
2870 E12
2871 F13
2872 F14
2873 F14
2874 I15
2875 I12
2876 G14
2877 H14
2878 F 4
2879 F 2
3828 B 7
3829 B 8
3850 B 6
3851 D13
3852 D13
3853 E13
3854 E13
3855 G15
3856 G15
3857 I12
3860 B 9
3861 B 9
3862 H15
3863 H15
7850 C10

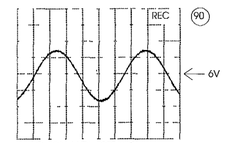
3-22



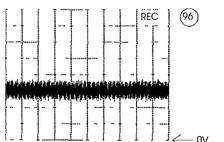
A: AC, 500mV/Div, 200us/Div
IC 7850 Pin 15, 16



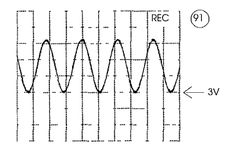
A: AC, 200mV/Div, 100us/Div
IC 7850 Pin 37



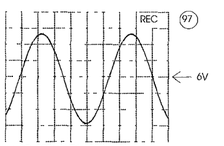
A: AC, 500mV/Div, 200us/Div
IC 7850 Pin 11



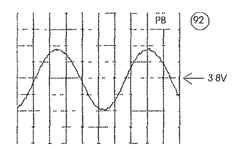
A: DC, 500mV/Div, 10us/Div
IC 7850 Pin 36



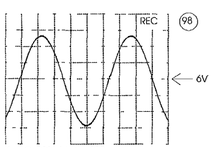
A: AC, 500mV/Div, 500us/Div
IC 7850 Pin 1, 2



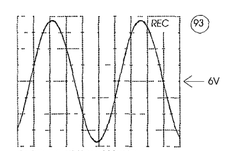
A: AC, 200mV/Div, 200us/Div
IC7850 Pin 7, 8



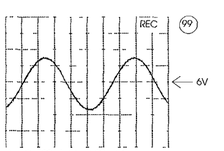
A: AC, 200mV/Div, 200us/Div
IC 7850 Pin 19



A: AC, 200mV/Div, 200us/Div
IC7850 Pin 5, 6

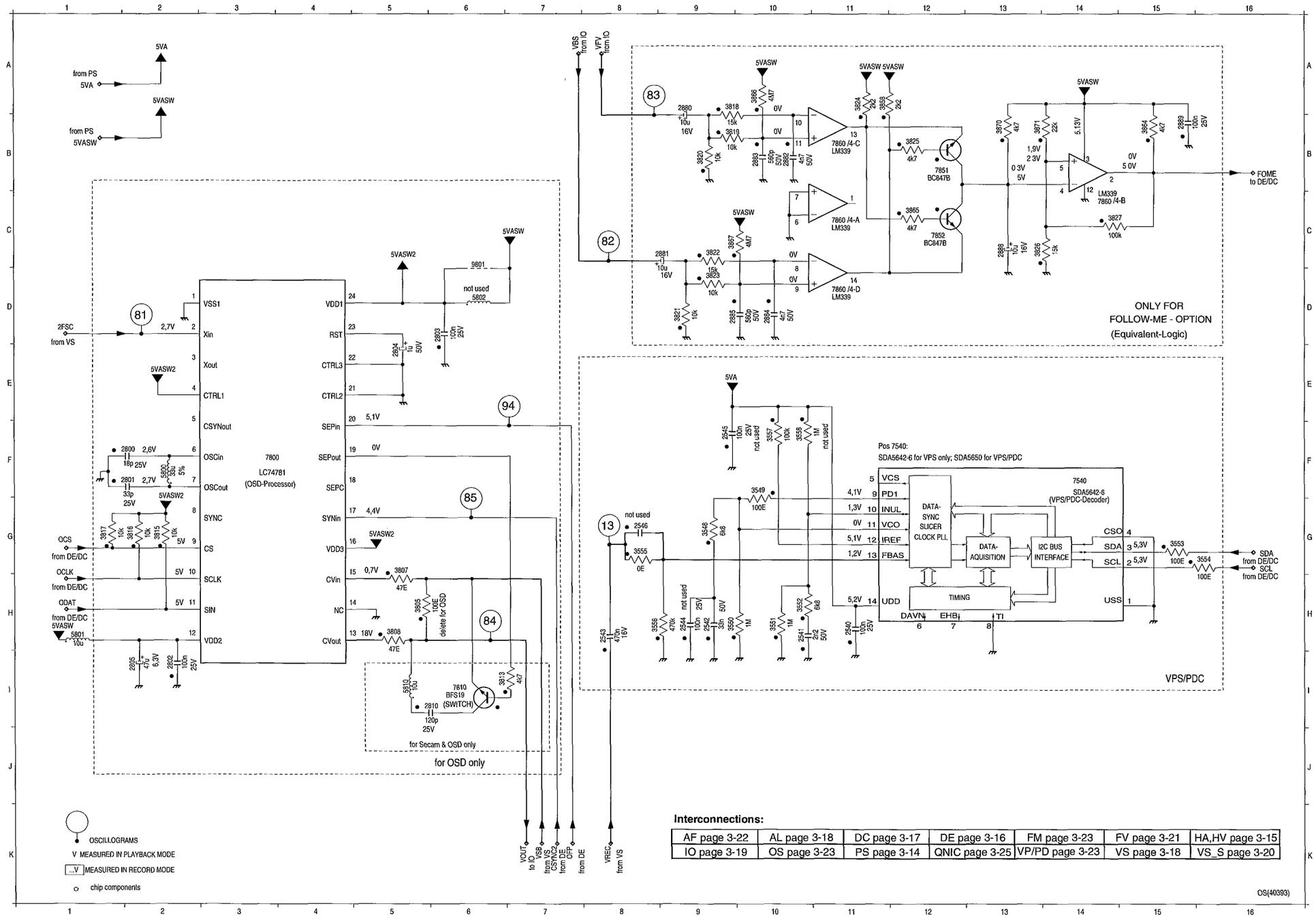


A: AC, 200mV/Div, 200us/Div
IC 7850 Pin 17



A: AC, 500mV/Div, 200us/Div
IC 7850 Pin 9, 10

On Screen Display (OS), Follow Me (FM), Video Programming System / Programm Delivery Control (VP/PD)



Interconnections:

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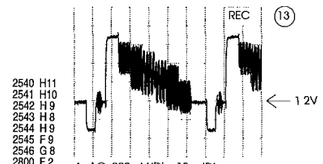
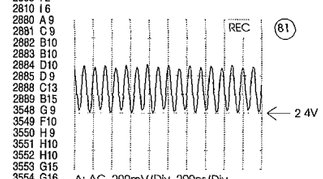
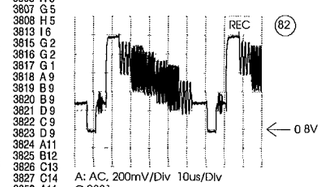
IO page 3-19	OS page 3-23	PS page 3-14	QNIC page 3-25	VP/PD page 3-23	VS page 3-18	VS_S page 3-20



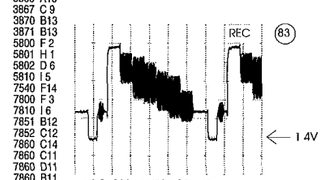
A: AC, 200mV/Div 10us/Div
IC 7540 Pin 13



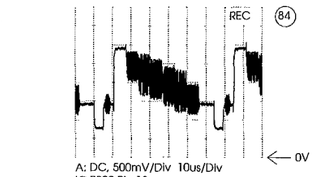
A: AC 200mV/Div, 200ns/Div
IC 7800 Pin 2



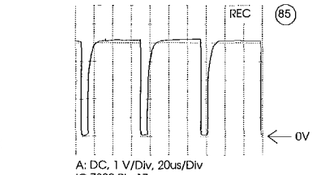
A: AC, 200mV/Div 10us/Div
C 2881



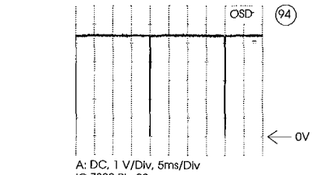
A: AC, 200mV/Div, 10us/Div
C 2880



A: DC, 500mV/Div 10us/Div
IC 7800 Pin 13



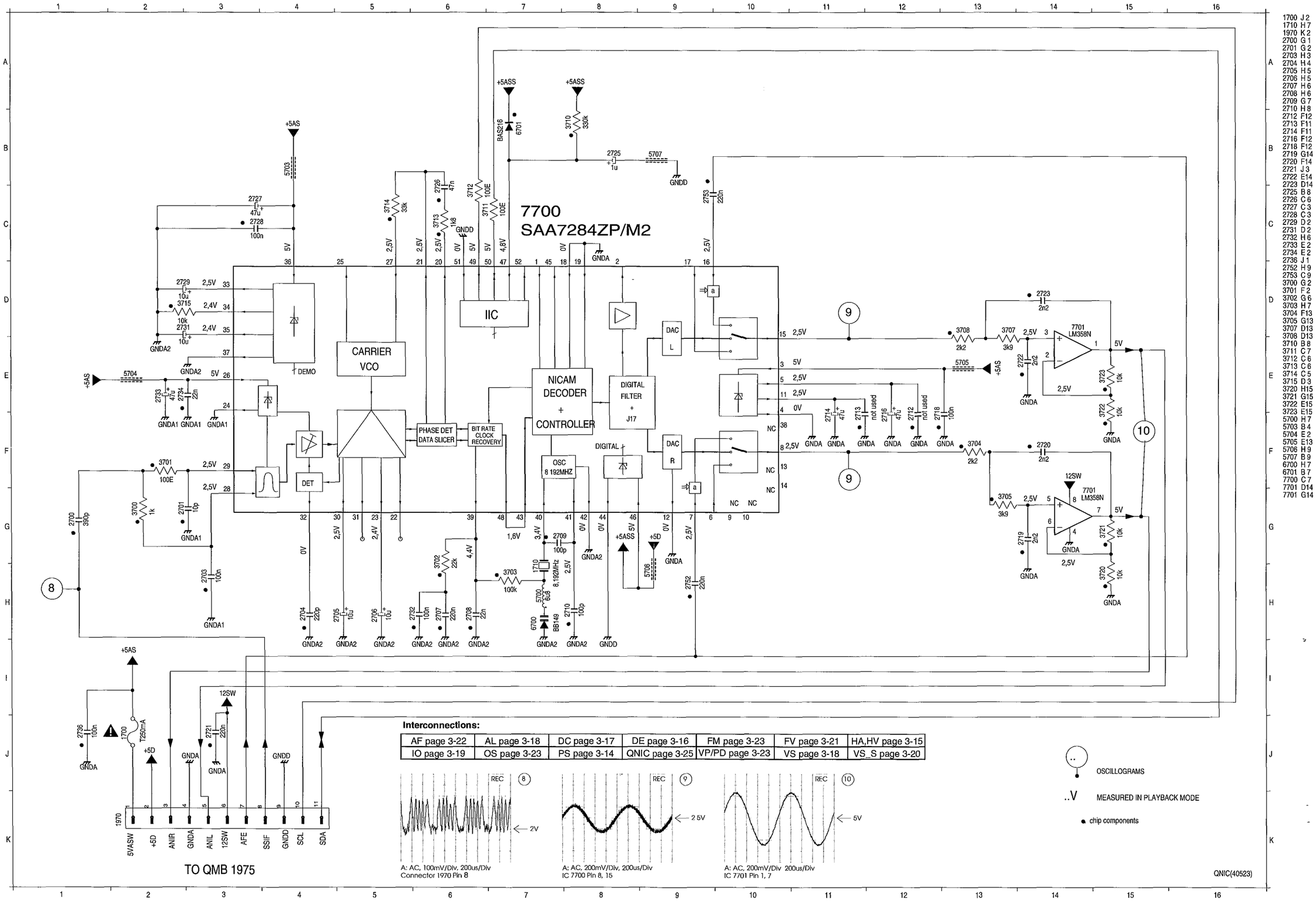
A: DC, 1 V/Div, 20us/Div
IC 7800 Pin 17



A: DC, 1 V/Div, 5ms/Div
IC 7800 Pin 20

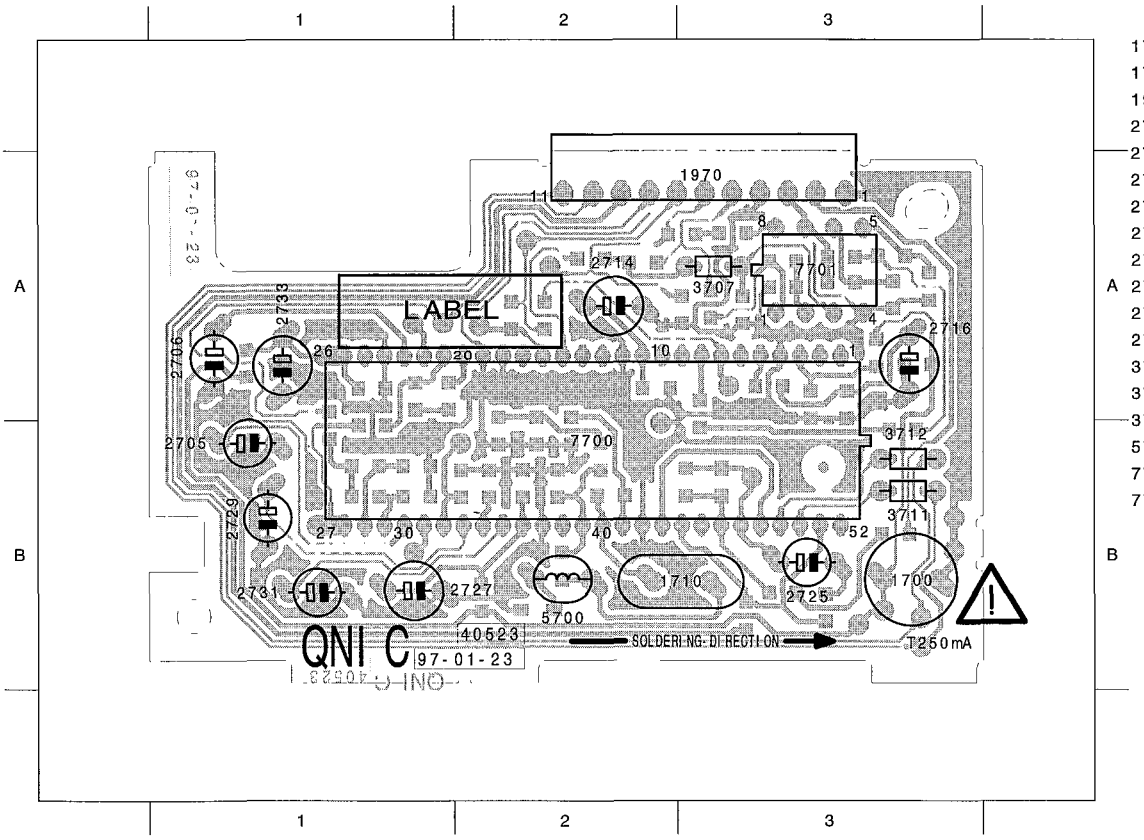
3-24

Nicam Board (QNIC)

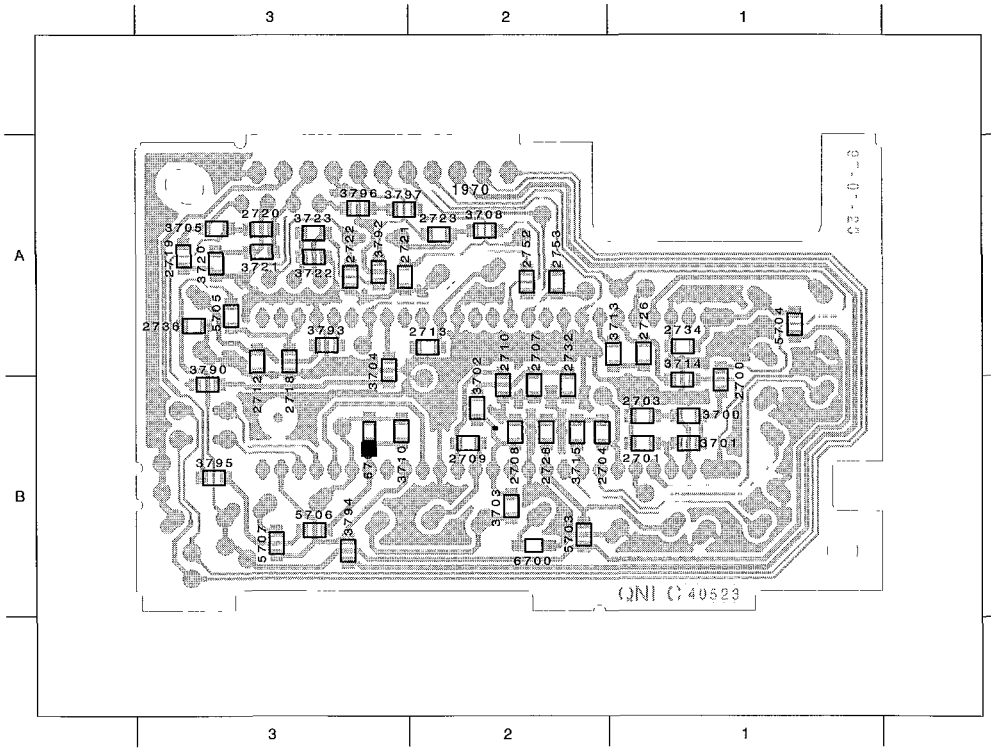


1700 J 2
1710 H 7
1970 K 2
2700 G 1
2701 G 2
2703 H 3
2704 H 4
2705 H 5
2706 H 5
2707 H 6
2708 H 6
2709 G 7
2710 H 8
2712 F12
2713 F11
2714 F11
2716 F12
2718 F12
2719 G14
2720 F14
2721 J 3
2722 E14
2723 D14
2725 B 8
2726 C 6
2727 C 3
2728 C 3
2729 D 2
2731 D 2
2732 H 6
2733 E 2
2734 E 2
2736 J 1
2752 H 9
2753 C 9
3700 G 2
3701 F 2
3702 G 6
3703 H 7
3704 F13
3705 G13
3707 D13
3708 D13
3710 B 8
3711 C 7
3712 C 6
3713 C 6
3714 C 5
3715 D 3
3720 H15
3721 G15
3722 E15
3723 E15
5700 H 7
5703 B 4
5704 E 2
5705 E13
5706 H 9
5707 B 9
6700 H 7
6701 B 7
7700 C 7
7701 D14
7701 G14

Nicam Board (QNIC)

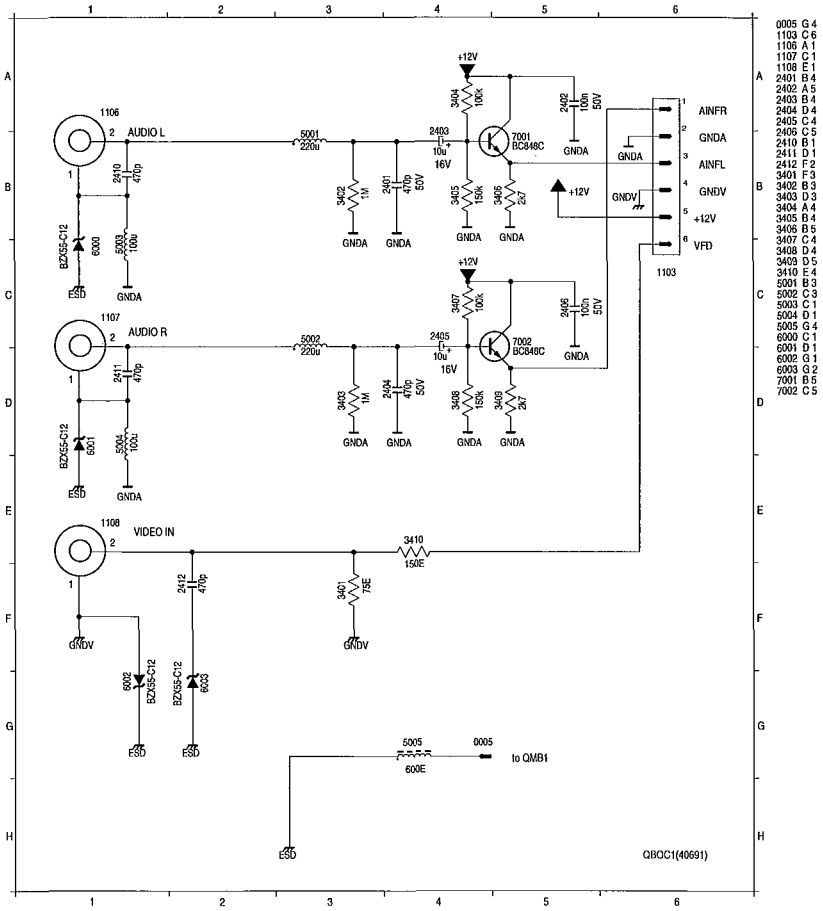


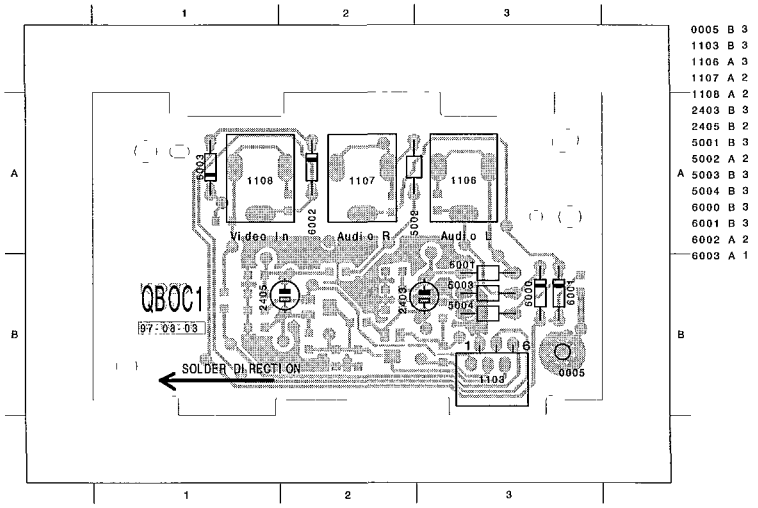
1700 B 3
1710 B 3
1970 A 3
2705 B 1
2706 A 1
2714 A 2
2716 A 3
2725 B 3
2727 B 1
2729 B 1
2731 B 1
2733 A 1
3707 A 3
3711 B 3
3712 B 3
5700 B 2
7700 B 2
7701 A 3

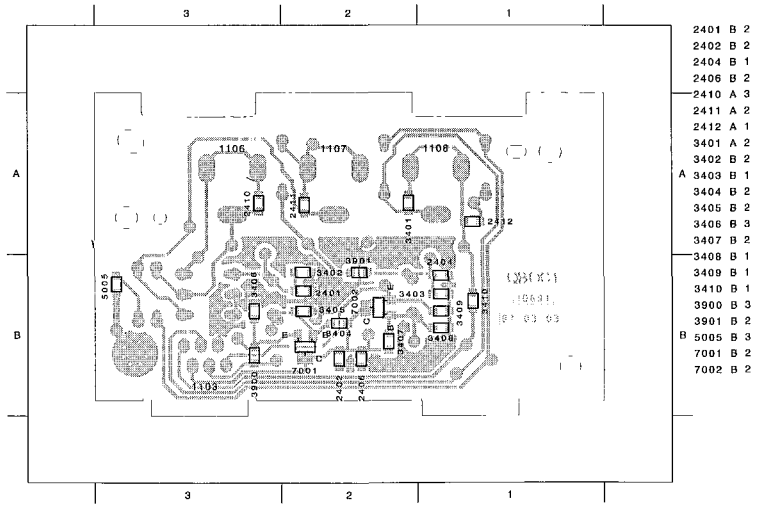


2700 B 1
2701 B 1
2703 B 1
2704 B 2
2707 B 2
2708 B 2
2709 B 2
2710 B 2
2712 A 3
2713 A 2
2718 A 3
2719 A 3
2720 A 3
2721 A 3
2722 A 3
2723 A 2
2726 A 1
2728 B 2
2732 B 2
2734 A 1
2736 A 3
2752 A 2
2753 A 2
3700 B 1
3701 B 1
3702 B 2
3703 B 2
3704 A 3
3705 A 3
3708 A 2
3710 B 3
3713 A 1
3714 B 1
3715 B 2
3720 A 3
3721 A 3
3722 A 3
3723 A 3
3790 B 3
3792 A 3
3793 A 3
3794 B 3
3795 B 3
3796 A 3
3797 A 3
5703 B 2
5704 A 1
5705 A 3
5706 B 3
5707 B 3
6700 B 2
6701 B 3

Socket Board QBOC1







4. DRIVE ASSEMBLY

This tape deck has three motors, one providing precision drive for the scanner unit; the second providing direct drive for the capstan and belt drive for the reel tables; the third motor drives the lift and tape threading/dethreading operations.

Special features are·

Quick start
Short winding time
Automatic cleaning of video heads by cleaning roller

To obtain a high repair standard we have developped a range of service kit's These kit's covers the spare parts which are engaged together.
The tape deck's sensors are located on the motherboard underneath the tape deck, and included in its circuitry, lay out and parts list.

4.1 Deck parts replacement

The procedure for the removal and refitting of the following parts is described; only the lift, the scanner, the capstan motor and the A/C head are fixed by screws
All the other deck assembly parts are held only by snap hooks.

For the replacement of parts on the underside of the tape deck, remove the tape deck from the motherboard.

Manual extraction of cassette:
If, after the Eject button has been pressed, the drive does not unthread and eject the cassette, the dethreading/eject operation can also be carried out manually by turning the wheel at the rear of the threading motor

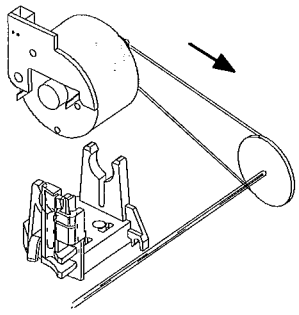
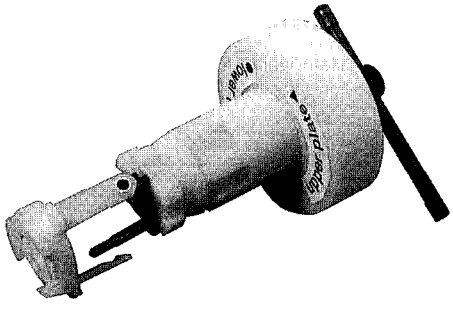


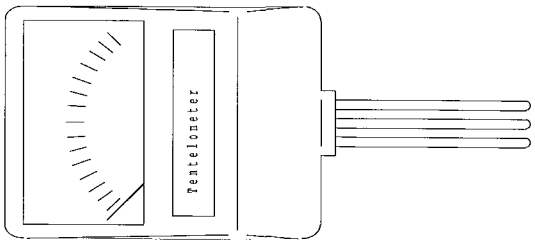
fig. 1

IMPORTANT:
After each repair has been carried out in the drive assembly, the first operation after repairing must be to bring the cassette compartment into „eject" position by hand

Auxiliary tools for deck adjustment:

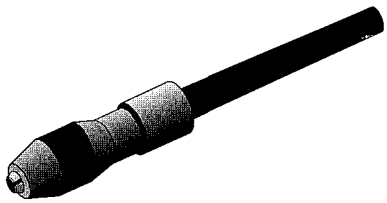


Tool for removing the head disc R4822 395 90977

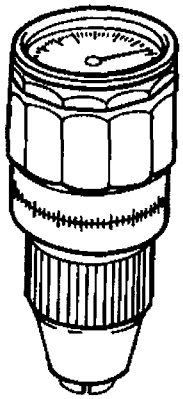


Tentelometer R4822 395 90584

Tool for tapetension adjustment R4822 395 50188



Handle R4822 256 90493



Torquemeter·

600 gf-cm R4822 395 90232
90 gf-cm R4822 395 80196

Post adjustment screwdriver R4822 395 50275

Testcassette R4822 397 30103

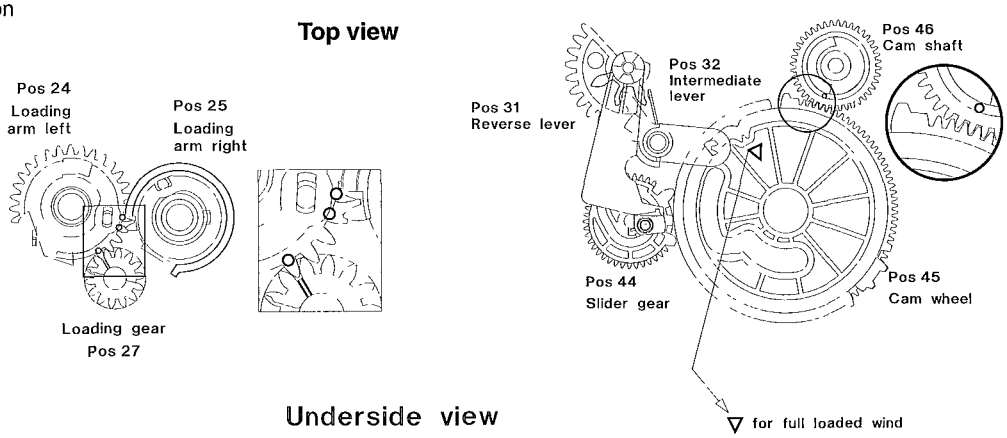
Nylon gloves R5322 395 94022

4.1.1 Deck lay out diagram

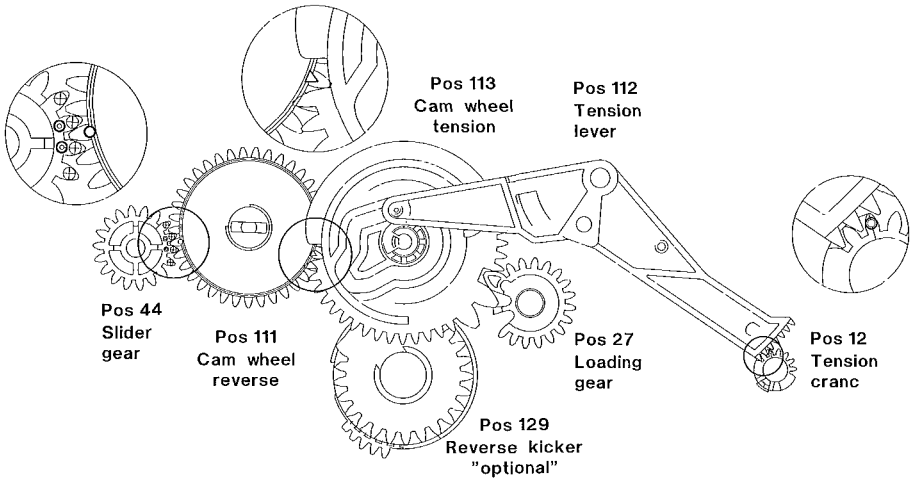
Deck in position „threaded out"

The following diagrams indicate the relative position of the gearwheels and levers when the deck is in the threaded out (cassette-compartment down) position

Top view



Underside view



4.1.2 The Lift

Refitting the lift compartment:
Ensure the lift compartment is down and gear A is rotated one click stop anticlockwise from the down position.
The removal and refitting of the lift can be carried out in all deck positions with the exception of „eject" (ensure that gears 103/105 are free)

To remove the lift.
Free the holding bracket (Fig 2) by rotating it up and back from the upper end
Unscrew the 4 screws on the underside of the deck
Carefully remove the lift vertically, noting the position of the record protect operating lever.

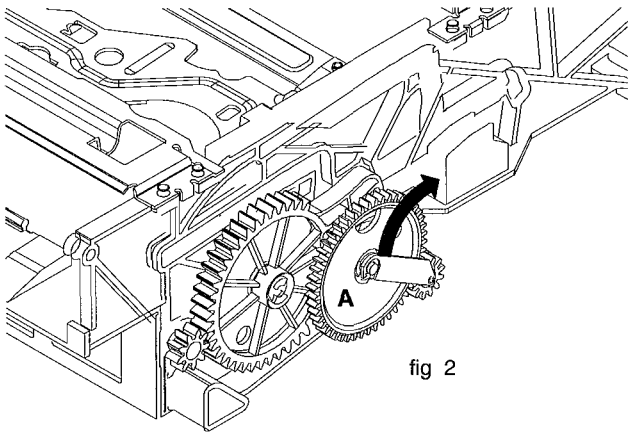


fig 2

4.1.3 Head disc replacement

Removal :

Nylon gloves should be worn when handling the head disc
Turn the headdisc until the long hole of the rotor appears in the bigger hole of the scannermotor
Insert the reference pin C (included with each service head disc) through the bigger hole of the lid of the scanner motor until the pin snaps in the long hole of the rotor (Fig. 3)

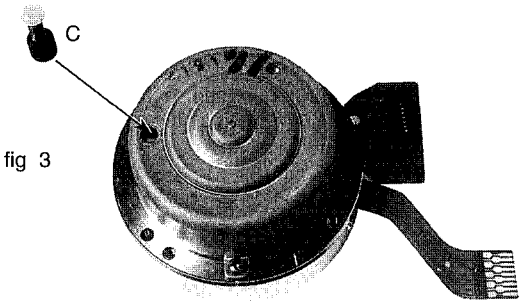


fig 3

Important:
Choose Installation/Removal of the upper/lower clamping element by turning and attaching the reference element to the tool. (Fig 4)

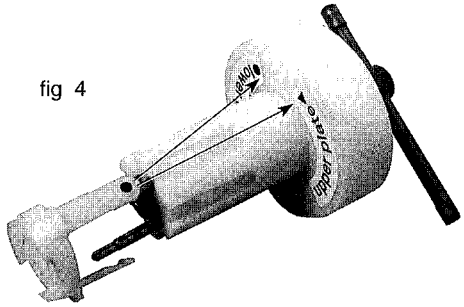


fig 4

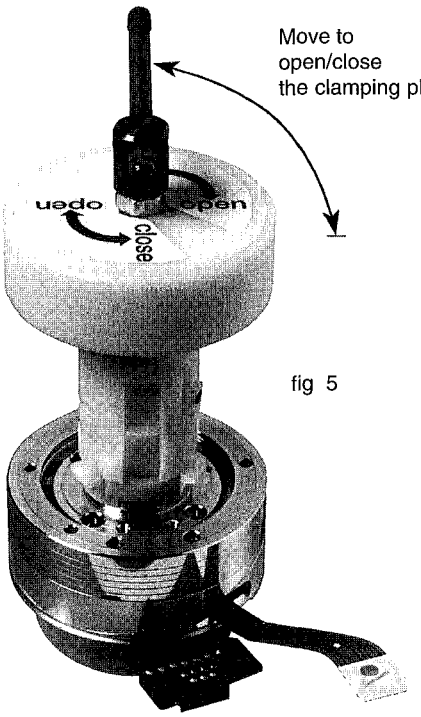


fig 5

Position the tool on the upper clamping element, loosen the clamping element by turning the lever 90 degrees and remove it from the head disc (Fig 5)

Prepare the tool for the lower clamping element Position the tool on the head disc and make sure that all 3 pins are snapped in the the lower clamping element. Loosen the clamping element by turning the lever 90 degrees and remove the head disc plus the tool from the scanner spindle. (Fig 6)

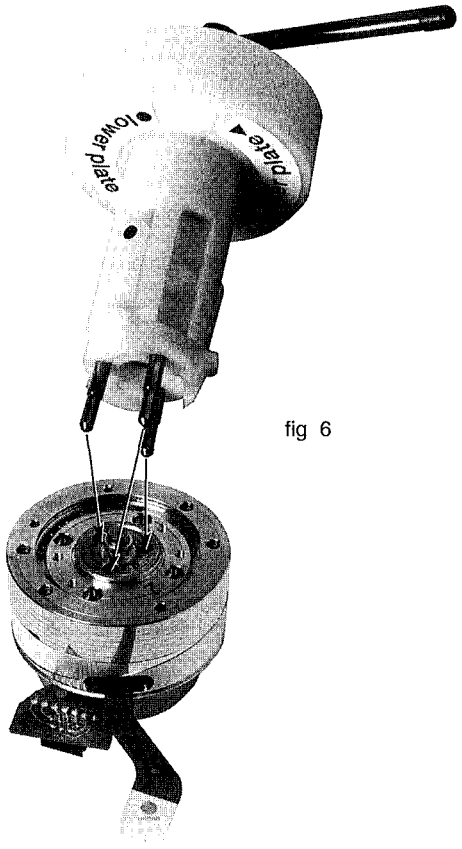


fig 6

Installation:
Before carrying out the installation of the new head disc make sure that the scanner motor spindle is clean and undamaged. (The spindle has to be free of grease and must not be touched with bare hands)
Insert the 2 Mylar foils (included with each head disc) in the head disc (Fig.7)

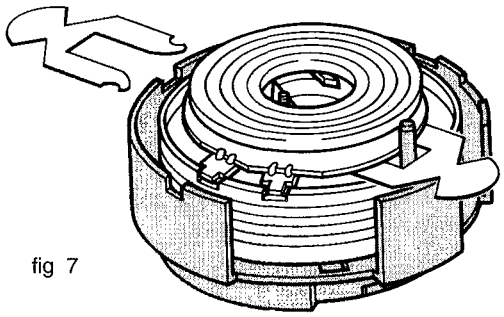


fig 7

Position the tool (reference: lower clamping element) on the new headdisc (with protective cover) and loosen the lower clamping element.
Position the head disc so that pin D of the protective cover engages in the hole of the stator (the arrow on the protective cover must point towards the scanner print) (Fig. 8)

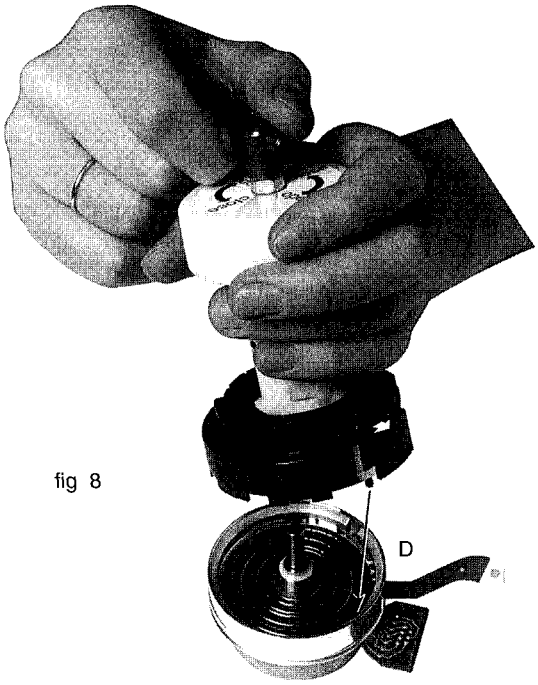


fig 8

Reach the exact position through pressing the tool down with a force of 1 N. and fix the lower clamping element by turning the lever towards „close"
Remove the tool
Change the tool to „upper clamping element" and position the clamping element exactly (Fig 9)

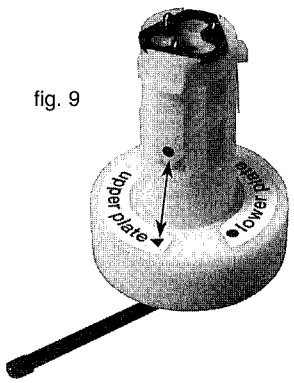


fig. 9

Tighten the clamping element through turning the lever towards „open"
Position the tool planely on the head disc and fix the clamping element. (Fig 5 „close")
Remove the protecting cap from the head disc, withdraw the two Mylar foils and remove the reference pin C.

After replacing the head disc, carry out the following adjustments and checks :
Head switching pulse (gap position, chapter 3)
Write current adjustments (chapter 3)
Check tape path alignment (see paragraph 4 2 1)

4.1.4 A/C Head (Combi head) (Pos. 36)

Remove the fixing spring (A) (fig. 10)
Remove the fixing screw and replace the A/C head
Use a new fixing spring (included with new A/Chead) for reassembly

After the A/C head has been replaced, all adjustments described in paragraph 4 2 1.2 and paragraph 4 2 2 have to be carried out.

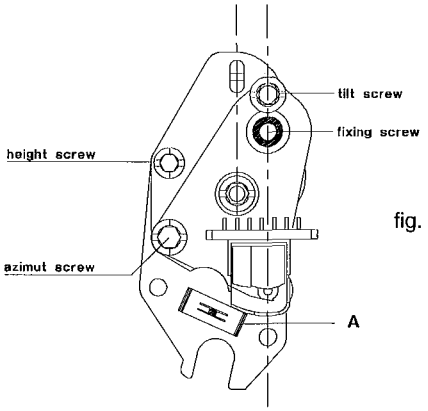


fig. 10

4.1.5 Threading motor (Pos. 38)

Remove the belt and disconnect the connector plug
Remove the threading motor from the motor supports (Fig. 11)

During reassembly ensure that the threading motor is correctly located in the front and rear supports.

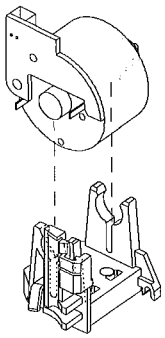


fig 11

4.1.6 Capstan motor (Pos. 127)

Remove the tape deck.
Remove the belt (pos 126) on the underside;
Remove the three capstan motor fixing screws (Fig 12) and withdraw the capstan motor downward from the drive assy.
The reassembly is carried out in reverse order Make sure that the capstan is free of grease

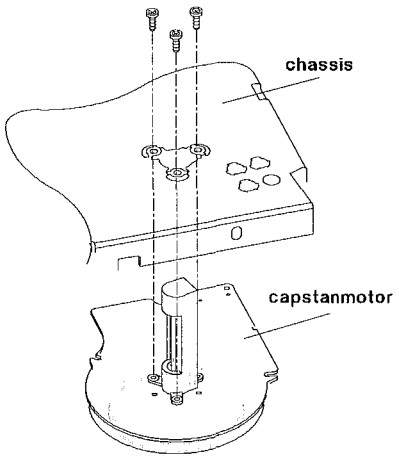


fig. 12

4.1.7 Pressure roller (Pos. 37)

Remove the tape deck
Unhook and remove the pressure roller tension spring.
Release the pressure roller guide (pos. 41) from the guide in the threading motor holder by pressing the top of the motor guide rearwards and rotating the pressure roller guide assembly clockwise by approximately a quarter of a turn (Fig. 13) The pressure roller and guide can now be lifted clear.

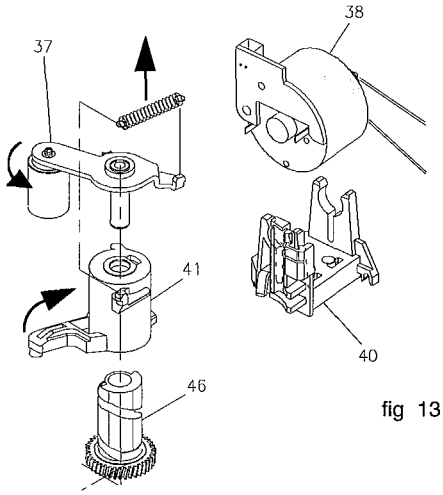
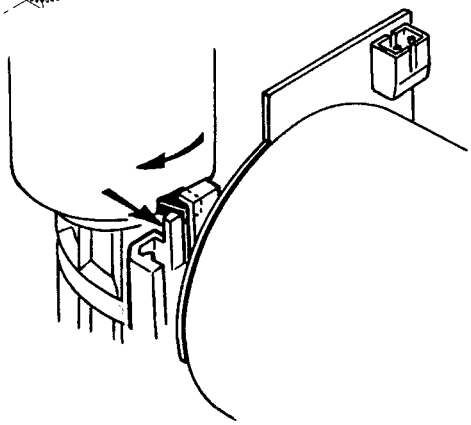


fig 13



Ensure that no grease from the pressure roller guide gets to the capstan or pressure roller
The reassembly is carried out in reverse order.

4.1.8 Roller unit right (Pos. 26)

Remove the tape deck
Compress the two snap hooks by means of a pair of tweezers and remove the roller assy from the roller unit right (Fig 14)
Unhinge the loading arm right from the holding plate and push the latter towards the front of the deck to remove from the guide (right)

NOTE· During reassembly ensure the link from 25 is engaged in the hole of the holder plate 26.
After replacing the roller unit (right), the tape path has to be checked, and adjusted if necessary (paragraph 4.2.1)

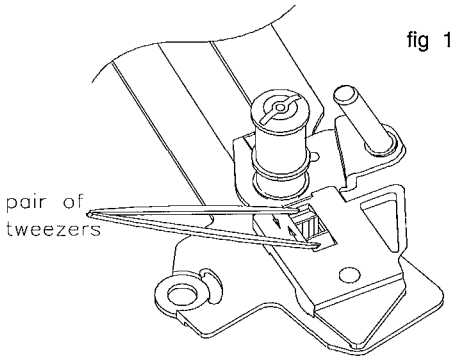


fig 10

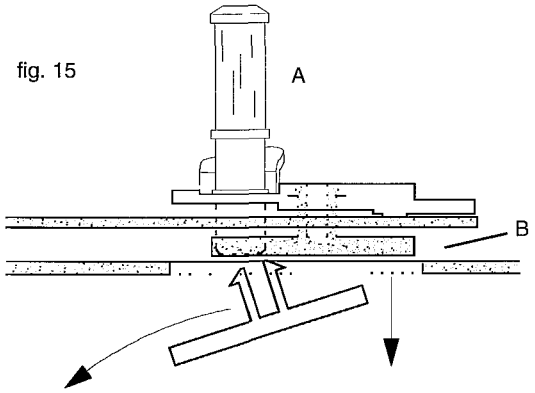
4.1.9 Roller unit left (Pos.23)

Set the drive assy to „Eject" position
Unhook the tension arm spring (pos. 11), to avoid the tension arm spring being pre-loaded.
At the bottom side of the drive assy remove the tension lever (pos.112).
Compress the two snap hooks by means of a pair of tweezers (Fig 9)and remove the roller assy (A) from the plate (B)
Unhinge the loading arm (left) from the holding plate and remove the latter downward from the drive assy through the recess in the chassis (Fig. 15)
The reassembly is carried out in reverse order.

NOTE : During reassembly
1 Place the carriage holding plate in the assembly with the half-round cutout nearest the rear of the deck
2 When the loading arm is refitted ensure the pin on the underside of 23 is through the link of 24B.

After replacing the roller unit (left) the tape path has to be checked (paragraph 4.2 1), and adjusted if necessary

fig. 15

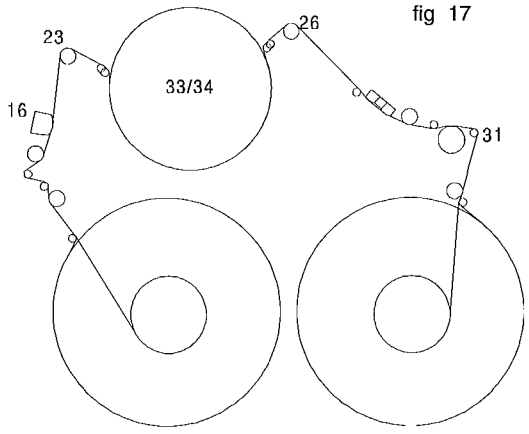


4.2 Adjustments

Adjustments must not be made in the service position

4.2.1 Tape path

fig 17



4.2.1.1 Roller left unit/roller unit right

Preparation:
Connect one input of a dual trace oscilloscope to observe the tape sync pulse CTL (pos 7460 IC SAA1310 pin16) The other input (DC coupled) to observe the tracking information TRIV.
Trigger the oscilloscope externally on the head pulse HP1 ("SWIN")
Playback the black and white section of the alignment test tape
Set the deck in the condition where the video heads are running along the upper edge of the tracks only by

1 Call the service test program (chapter 2 1)
2. Activate manual tracking (service test program step 03) and watch the tape sync pulse move to the left in relation to the TRIV signal.
3. Note the extreme left hand position reached by the sync pulse, repeat as necessary
4. Stop the movement of the pulse when the TRIV signal reduces to 1/2 to 2/3 maximum amplitude by pressing the normal play button A noisy picture (disturbances) is visible on the TV set and the CTL pulse should be to the left of the display.
The recorder will hold this position until the service test progam step 03 is left
This condition works only if X-distance is adjusted.

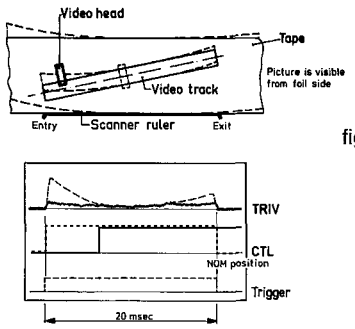


fig. 18

Adjustment:
Adjust the left and right roller units to make the tracking signal TRIV straight and flat as possible (Fig 18)

4.2.1.2 A/C Combi head

Tilt angle adjustment

Set the drive to feature mode (e g +7)
Adjustment
By means of the tilt angle adjusting screw move the tape until the lower edge just touches the tape guide A1 (see Fig 19) the tape must not be distorted at the lower edge (by pressing onto guide).

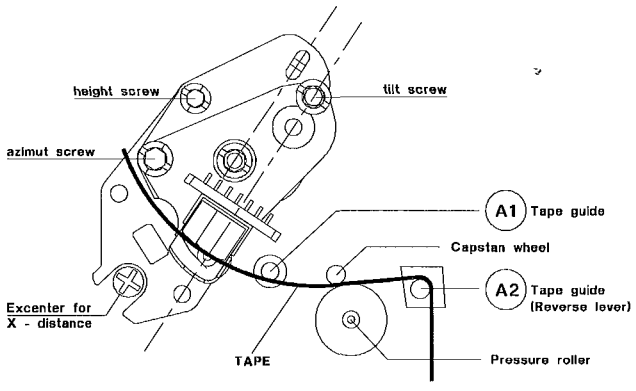


fig.19

Adjustment of the azimuth angle and the head height

Connect an oscilloscope to the linear Audio output
Play the section of the test cassette with the audio signal 400 Hz
Adjust for maximum output voltage by means of the height adjustment screw
Play the section of the test cassette with the audio signal 8 kHz
Adjust to maximum output voltage by means of the azimuth adjustment screw (Fig 19)
If necessary, repeat this procedure
Check the tilt angle adjustment

If the tape path was completely out of adjustment or if several components in the tape path have been replaced, it is possible, that the adjustments described in paragraph 4 2 1 1 and paragraph 4 2 1 2 have to be repeated several times

4.2.2 Adjustment of the horizontal distance (x-distance)

Before this adjustment is carried out, insert the test cassette (start from Eject position) Call the service test program (tracking value will take up its nominal position) and press the „play" button.
Playback the black/white part of the test cassette)
Display the TRIV signal on an oscilloscope (DC-coupled) and adjust for maximum voltage by means of the excentric screw (Fig.19).

4.2.3 Brake band and tape tension

Due to further development it is no longer necessary to make theseadjustments after replacement of the brake band
If the brake band or tape tension are completely misadjusted, set them to a center position; set the drive to „play" and adjust the brake band until the edge of the elbow of the tape tension arm is aligned with the left inner edge of the left guide (fig 20).

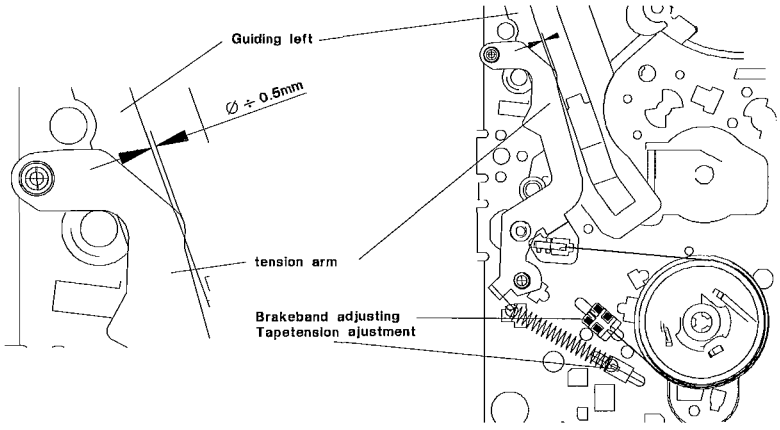
4.2.4 Friction clutch control check

Set the drive to „Play" position.
Place the torquemeter on the right reel
Turn the capstan motor to move the right reel clockwise.
Keep turning, until the indication at the torquemeter no longer changes (Fig. 21)
The torque has to be 10,5 mNm +/-25% (105gFcm +/-25%)

4.2.5 Reverse brake control

Set the drive to „Reverse" position.
Place a torquemeter on the right reel and turn the latter counterclockwise, until the reel just starts to flip
The value indicated at the torquemeter has to be 7mNm +/-3mNm (70 gFcm +/-30gFcm) (Fig 21)

fig. 20



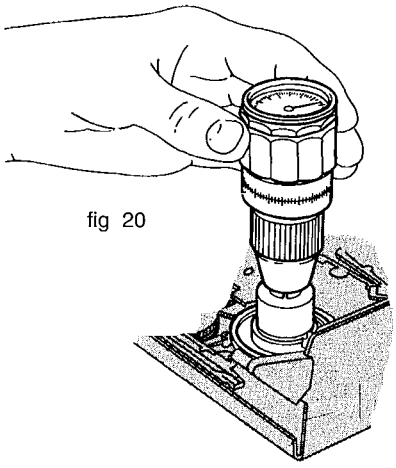
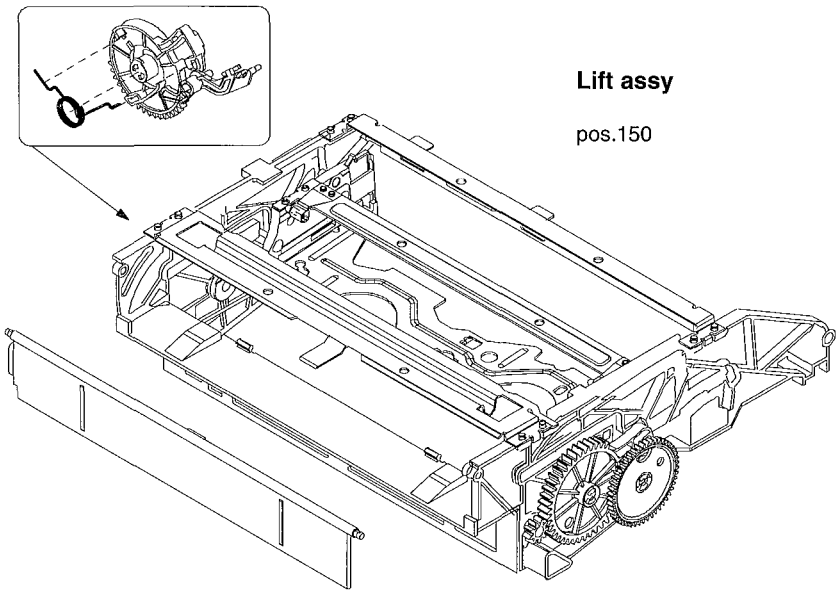


fig 20

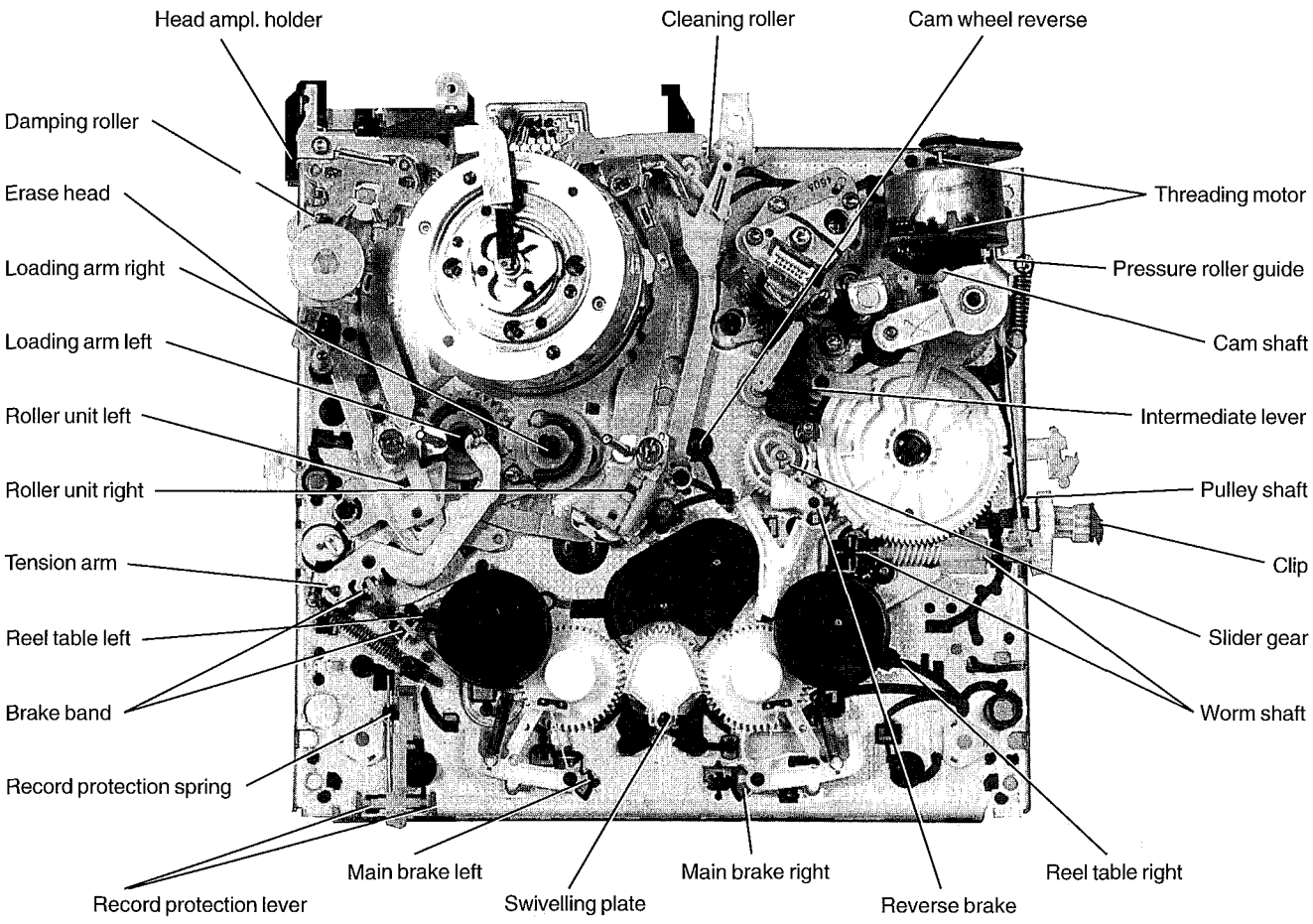


Lift assy

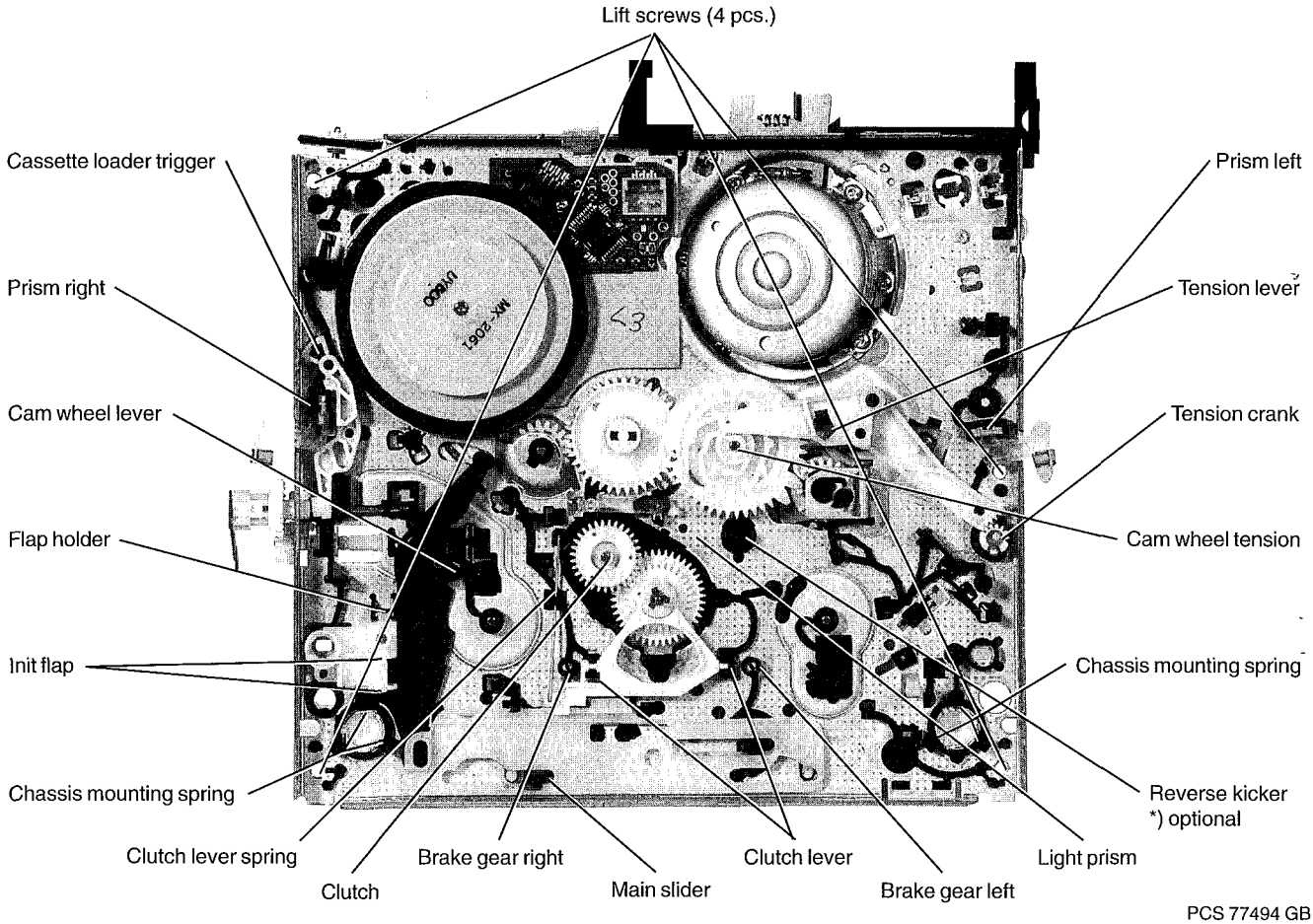
pos.150

In order to make the replacement of the deck parts easier, the snap hooks are marked with an arrow.

TOP VIEW



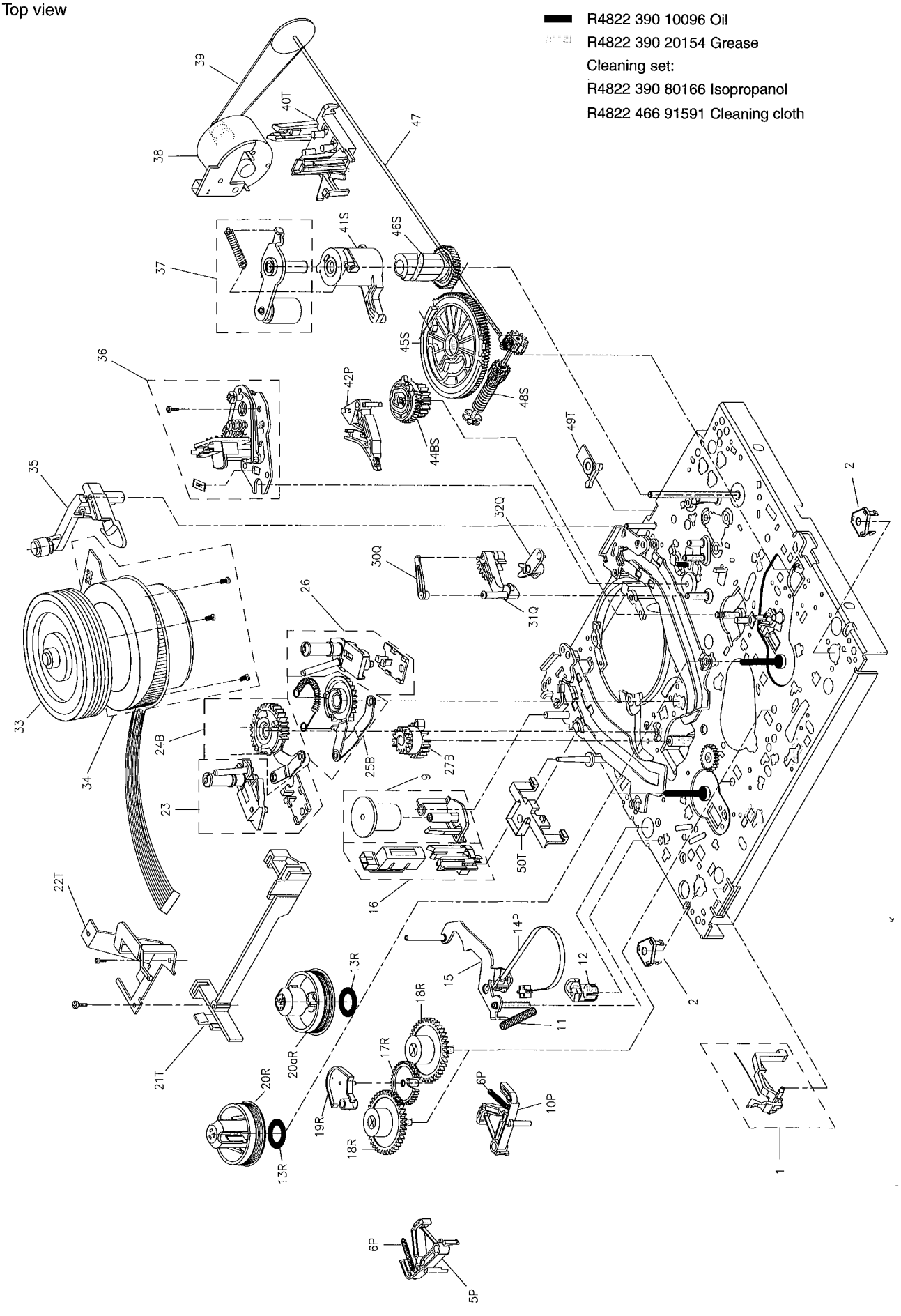
UNDERSIDE VIEW



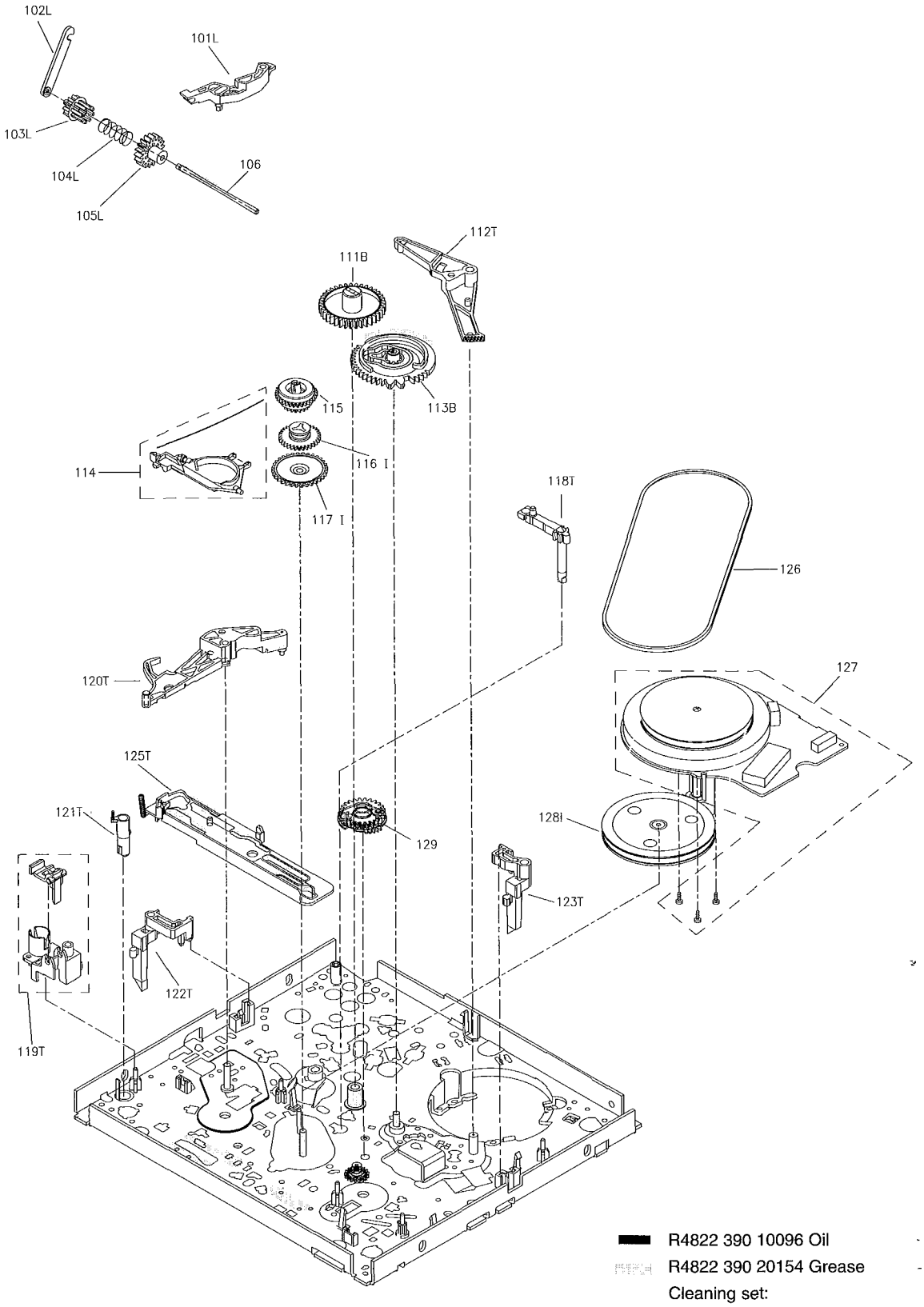
PCS 77494 GB

4.3 Exploded view

Top view



Underside viw



R4822 390 10096 Oil
R4822 390 20154 Grease
Cleaning set:
R4822 390 80166 Isopropanol
R4822 466 91591 Cleaning cloth

MECHANICAL PARTS LIST

Pos.	Description	K I T S								Code number R4822
		B	I	L	P	Q	R	S	T	
1	Rec. protection lever (with spring)									402 10202
2	Chassis mounting spring (2x)									492 71022
5	Main brake left				P					
6	Main brake spring (2x)				P					
9	Damping roller *)									528 70782
10	Main brake right				P					
11	Tension arm spring									492 33317
12	Tension crank									403 70551
13	Slip ring						R			
14	Tension band				P					
15	Tension arm									403 70547
16	Erase head									249 10522
17	Swivelling gear						R			
18	Brake gear (2x)						R			
19	Swivelling plate						R			
20	Reel table (S)						R			
20a	Reel table (T)						R			
21	Headamplifier holder								T	
22	Bracket								T	
23	Roller unit left									528 70771
24	Loading arm left	B								
25	Loading arm right	B								
26	Roller unit right									528 70772
27	Loading gear	B								
30	Reverse clip					Q				
31	Reverse lever					Q				
32	Intermediate lever					Q				
33	Head disc 2/0									691 10583
33	Head disc 2/0-LP									691 10585
33	Head disc 4/0									691 21011
33	Head disc 4/0 Secam									691 21012
33	Head disc 4/2									691 10548
33	Head disc 4/2 Secam									691 10551
34	Scanner motor 2/0 (with screws)									361 10963
34	Scanner motor 4/0 (with screws)									361 10819
34	Scanner motor 4/2 (with screws)									361 10901
35	Cleaning roller									528 70773
36	A/C Head (with clip and screws)									249 10468
37	Pressure roller (with spring)									528 70774
38	Threading motor									361 10809
39	Threading belt									358 20421
40	Motor holder								T	
41	Pressure roller guide							S		
42	Reverse brake				P					
44	Slider gear	B						S		
45	Cam wheel							S		
46	Cam shaft							S		
47	Pulley shaft									528 81462
48	Worm shaft							S		
49	Chassis mounting clip								T	
50	WD-holder								T	

Pos.	Description	K I T S								Code number R4822
		B	I	L	P	Q	R	S	T	
101	Cassette loader trigger			L						
102	Clip			L						
103	Cassette loader gear1			L						
104	Cassette loader spring			L						
105	Cassette loader gear2			L						
106	Spindle									535 93277
111	Cam wheel reverse	B								
112	Tension lever								T	
113	Cam wheel tension	B								
114	Clutch lever (with spring)									403 70549
115	Clutch									528 20736
116	Changing gear		I							
117	Double gear		I							
118	Light prism								T	
119	Init flap and holder								T	
120	Cam wheel lever								T	
121	S-VHS lever								T	
122	Prism rihgt								T	
123	Prism left								T	
125	Main slider								T	
126	Driving belt									358 31166
127	Capstan motor (with screws)									361 10805
129	Reverse kicker with transmission gears *)									522 20451
128	Gear pulley		I							
150	Lift									443 64112
KIT	B									310 31955
KIT	I									310 31963
KIT	L									310 32116
KIT	P									310 32191
KIT	Q									310 10658
KIT	R									310 10659
KIT	S									310 10661
KIT	T									310 10662

*) optional

Um eine hohen Reparaturstandard zu gewährleisten sind mit Ausnahme von Kit T immer alle im Kit enthaltenen Teile zu tauschen

In order to guarantee a high repairstandard all spare parts included in a kit have to be replaced with the exception of kit T.

Per una riparazione garantita ocorre sostituire tutti i pezzi contenuti nei kit, fatta eccetione per il kit T

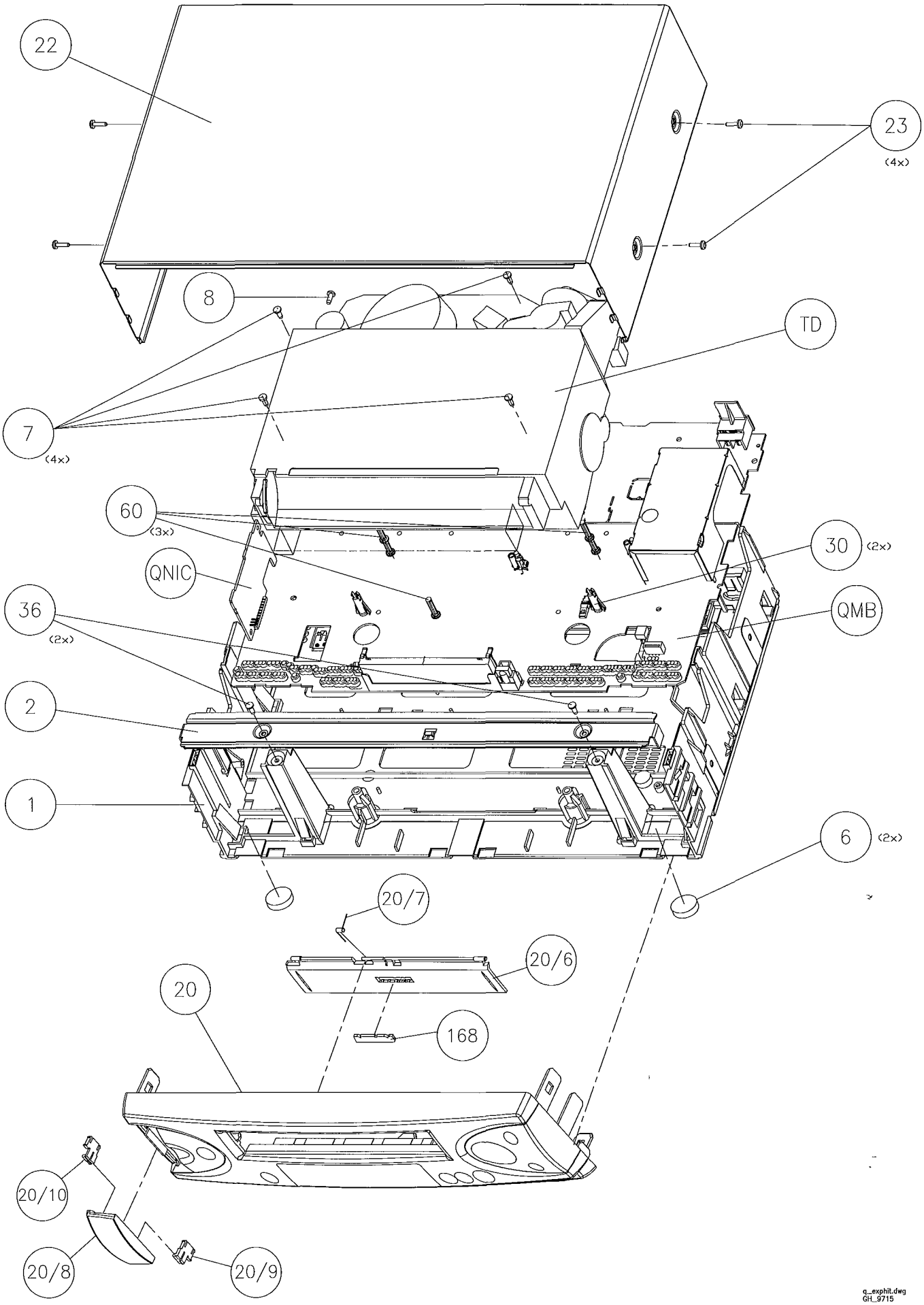
Para obtener un estandár de reparaciones elevado,es necesario cambiar todas las partes contenidas en el kit, la única excepti0n es para el kit T

A fin d'obtenir un standard de réparations élevé, toutes les pièces de rechange incluses dans un kit sont à remplacer, exception faite du kit T

Om een hoge reparatiekwaliteit te waarbogen moeten, met uitzondering van kit T, altijd alle zich in een kit bevindende onderdelen worden vervangen

PARTS LISTS

Exploded View set



Parts lists

Pos	Service Code	Description	VT-F641ENA	VT-F641EUKN	VT-F641EVPS	VT-F652ELN	VT-M602EL	VT-M605EVPS	VT-M610EPV	VT-M610EUK	VT-M631EUK	VT-M631EVPS	VT-M632EL
1	R3103 138 86290	Frame 2 SCART					✔	✔	✔	✔	✔	✔	✔
	R3103 138 86070	Frame CINCH	✔	✔	✔	✔							
2	R3103 141 22800	Bracket	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
6	R3103 184 00830	Foot	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
7	R3103 100 42400	Screw 3,5X16	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
8	R3103 100 42530	Screening screw	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
20	R3103 138 87270	Control panel	✔										
	R3103 138 87120	Control panel		✔									
	R3103 138 87280	Control panel			✔								
	R3103 138 87260	Control panel				✔							
	R3103 138 86870	Control panel					✔						
	R3103 138 86830	Control panel						✔					
	R3103 138 87230	Control panel							✔				
	R3103 138 86820	Control panel								✔			
	R3103 138 87110	Control panel									✔		
	R3103 138 87240	Control panel										✔	
	R3103 138 87250	Control panel											✔
20/6	R3103 178 21500	Lift flap	✔										
	R3103 178 21210	Lift flap		✔									
	R3103 178 21510	Lift flap			✔								
	R3103 178 20970	Lift flap				✔							
	R3103 178 20430	Lift flap					✔						
	R3103 178 20410	Lift flap						✔					
	R3103 178 21420	Lift flap							✔				
	R3103 178 20970	Lift flap								✔			
	R3103 178 21220	Lift flap									✔		
	R3103 178 21430	Lift flap										✔	
	R3103 178 21440	Lift flap											✔
20/7	R3103 111 02450	Leg spring	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
20/8	R3103 178 21470	Flap front				✔							
20/9	R3112 404 10420	Hinge				✔							
20/10	R3112 404 10431	Hinge				✔							
22	R3103 141 23160	Cover lacquered	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
23	R3112 400 40220	Screw 3,5X10	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
30	R3103 107 61760	Distance holder deck	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
36	R3103 100 41320	Screw P2,9X12	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
60	R3103 104 20110	Distance holder MOBO	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
151	R8622 661 73301	Remote RT173/301	✔	✔	✔			✔	✔	✔	✔	✔	
	R8622 661 73304	Remote RT173/304				✔	✔						✔
152	R3103 166 19270	Direction for use S	✔										
	R3103 166 19280	Direction for use DK,F,NL,I	✔										
	R3103 166 18990	Direction for use GB		✔									
	R3103 166 19290	Direction for use D			✔								
	R3103 166 19300	Direction for use I			✔								
	R3103 166 19210	Direction for use F				✔							
	R3103 166 18850	Direction for use F					✔						
	R3103 166 18720	Direction for use D,E,S						✔					
	R3103 166 18730	Direction for use F,I,NL,DK						✔					
	R3103 166 19130	Direction for use N,S							✔				
	R3103 166 19140	Direction for use D,F,NL,E							✔				
	R3103 166 18740	Direction for use GB								✔			
	R3103 166 18970	Direction for use GB									✔		
	R3103 166 19150	Direction for use DK,F,I,NL										✔	
	R3103 166 19160	Direction for use D,E,S										✔	
	R3103 166 19220	Direction for use F											✔
168	R3103 110 01280	Wordmark HITACHI	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Motherboard QMB PAL, SECAM, MONO, STEREO

CONNECTORS

1001⚠	R4822 267 10577	MAINS PLUG
1002	R4822 267 10498	CONN 3p
1710	R4822 265 30989	CONN 3p
1711	R4822 267 41062	CONN 6p
1750	R4822 267 10458	CONN. 3p
1908	R4822 267 10584	CONN. 1p
1909	R4822 267 10583	CONN. 1p
1910	R4822 267 10584	CONN 1p
1911	R4822 265 10938	CINCH 2p white
1912	R4822 265 10939	CINCH 2p red
1915	R4822 267 10364	CONN. 9p
1916	R4822 267 41199	CONN 5p
1917	R4822 264 10345	SCART CONN ORANGE
1918	R4822 264 10346	SCART CONN. BLUE
1930	R4822 267 41062	CONN. 6p
1944	R4822 265 30989	CONN. 3p
1946	R4822 267 10366	CONN. 8p
1961	R4822 267 31512	CONN 7p
1962	R5322 268 90415	CONN. 2p

MISCELLANEOUS

0005	R4822 256 10355	DISPLAY HOLDER
0008	R4822 256 10196	HOLDER
0020	R4822 256 10197	HOLDER
0021	R4822 256 10197	HOLDER
0022	R4822 256 10197	HOLDER
1000	R4822 242 81067	Crystal 4,433619MHZ
1001	R4822 267 10577	MAINS PLUG
1002	R4822 267 10498	BMT 3P HOR 890-90
1113	R4822 276 13732	SWITCH TACT PUSH
1145	R4822 276 13732	SWITCH TACT PUSH
1181	R4822 276 13732	SWITCH TACT PUSH
1185	R4822 276 13732	SWITCH TACT PUSH
1192	R4822 276 13732	SWITCH TACT PUSH
1224	R4822 276 13732	SWITCH TACT PUSH
1230	R4822 276 13732	SWITCH TACT PUSH
1233	R4822 276 13732	SWITCH TACT PUSH
1236	R4822 276 13732	SWITCH TACT PUSH
1297	R5322 242 73682	Crystal 32,768 KHZ
1298	R4822 242 82114	Crystal 8,00 MHZ
1350⚠	R4822 252 11234	Fuse 100 mA
1351⚠	R4822 071 55001	Fuse 500 mA
1352⚠	R4822 071 55001	Fuse 500 mA
1353⚠	R4822 070 31252	Fuse 1.25 A
1355⚠	R4822 252 11235	Fuse 1.0 A
1356⚠	R4822 252 11235	Fuse 1.0 A
1400	R4822 242 82059	Crystal 10 MHZ
1460	R4822 277 11521	Switch
1461	R4822 277 11521	Switch
1701	R4822 210 10701	TMRB1-101A, TP944 PAL-I/UK
1701	R4822 210 10702	TMRG1-101(2)A,TP916(L)PAL-G (Passive Loop Through)
1701	R4822 210 10698	TMRG2-101(2)A,TP926 SECAM (Booster SECAM)
1719	R4822 242 10688	OFWK9456M SEC-LL'
1720	R4822 242 81964	G1984 FM stereo PAL-G
1720	R4822 242 81737	G1965 mono SEC
1720	R4822 242 81436	OFWK3953M stereo SEC
1721	R4822 242 81388	OFWG1961M mono PAL-G
1721	R4822 242 10575	OFWJ1980M PAL-I
1740	R4822 242 72586	TPS 5,5MB-TF20 PAL-G
1740	R4822 242 81572	TPS 6,0MB-TF21 PAL-I
1745	R4822 242 70279	SFE 6,0MB SEC-L, PAL-I
1745	R4822 242 10428	EFCT5R5YS5A PAL-G
1746	R4822 242 10428	EFCT5R5YS5A
1747	R4822 242 10563	EFCT5R74YS5A stereo FM
1781	R4822 242 82059	Crystal 10 MHZ

CAPACITORS

2001	R4822 126 10002	100 nF	25V	
2002	R4822 122 33177	10 nF	50V	
2003	R4822 126 10002	100 nF	25V	
2004	R4822 122 33177	10 nF	50V	
2005	R4822 124 23055	22 µF	16V	
2006	R4822 126 13222	390 pF	63V	
2007	R5322 122 32966	39 pF	50V	
2008	R5322 122 32658	22 pF	50V	
2009	R4822 126 10002	100 nF	25V	
2010	R4822 124 80987	220 µF	6,3V	
2011	R4822 122 33177	10 nF	50V	
2012	R4822 124 11569	4,7 µF	25V	
2013	R4822 126 10002	100 nF	25V	
2014	R4822 124 80975	0,47 µF	50V	
2015	R4822 126 10002	100 nF	25V	
2016	R4822 126 10002	100 nF	25V	
2017	R4822 124 22826	10 µF	16V	
2018	R5322 122 32658	22 pF	50V	
2019	R4822 124 22826	10 µF	16V	
2020	R4822 124 22826	10 µF	16V	
2021	R4822 124 22826	10 µF	16V	
2022	R4822 126 10002	100 nF	25V	
2023	R4822 122 33177	10 nF	50V	
2024	R4822 126 10002	100 nF	25V	
2025	R4822 124 11568	47 µF	16V	
2026	R4822 122 33575	220 pF	50V	
2027	R4822 122 33177	10 nF	50V	
2028	R4822 122 33177	10 nF	50V	
2029	R4822 122 33177	10 nF	50V	
2030	R4822 122 33177	10 nF	50V	
2031	R4822 126 10002	100 nF	25V	
2032	R4822 124 11568	47 µF	16V	
2033	R4822 126 10002	100 nF	25V	
2034	R4822 122 33177	10 nF	50V	
2035	R4822 122 33177	10 nF	50V	
2036	R4822 122 33515	82 pF	63V	
2037	R4822 126 14124	220 pF		
2038	R5322 122 32659	33 pF	50V	
2038	R5322 122 32658	22 pF	50V	for 2 heads
2039	R4822 124 23053	1 µF	63V	
2040	R5322 122 32654	22 nF	63V	
2041	R4822 124 23053	1 µF	63V	
2042	R4822 122 33797	47 nF	50V	
2043	R4822 124 41969	1 µF	50V	
2044	R4822 124 23053	1 µF	63V	
2045	R4822 122 33797	47 nF	50V	
2046	R5322 122 34123	1 nF	50V	
2047	R4822 122 33177	10 nF	50V	
2049	R4822 124 11568	47 µF	16V	
2054	R4822 124 41969	1 µF	50V	
2055	R4822 122 33177	10 nF	50V	
2059	R4822 124 23053	1 µF	63V	
2064	R5322 122 31946	27 pF	63V	
2066	R4822 122 33177	10 nF	50V	
2080	R5322 122 32658	22 pF	50V	
2081	R4822 122 33177	10 nF	50V	
2082	R4822 122 33177	10 nF	50V	
2083	R4822 122 33177	10 nF	50V	
2084	R4822 122 33177	10 nF	50V	
2085	R4822 126 10002	100 nF	25V	
2086	R4822 124 11568	47 µF	16V	
2087	R4822 122 33177	10 nF	50V	
2089	R4822 122 33575	220 pF	50V	
2100	R4822 122 33177	10 nF	50V	
2101	R5322 122 32531	100 pF	50V	
2102	R5322 122 32658	22 pF	50V	
2103	R5322 122 34123	1 nF	50V	
2104	R4822 122 33177	10 nF	50V	
2105	R4822 122 33177	10 nF	50V	
2106	R4822 122 33177	10 nF	50V	
2107	R4822 122 33177	10 nF	50V	
2108	R5322 122 33538	150 pF	63V	
2109	R5322 122 32481	15 pF	50V	
2110	R4822 126 10002	100 nF	25V	
2111	R4822 126 13694	68 pF	63V	
2112	R4822 122 33177	10 nF	50V	
2113	R4822 126 10002	100 nF	25V	
2115	R4822 122 33575	220 pF	50V	

⚠... Safety component, use only this type

Motherboard QMB PAL, SECAM, MONO, STEREO

2116	R4822 122 33177	10	nF	50V	
2117	R5322 122 34123	1	nF	50V	
2118	R5322 122 32659	33	pF	50V	
2119	R5322 122 32531	100	pF	50V	
2121	R5322 122 34123	1	nF	50V	
2122	R4822 122 33177	10	nF	50V	
2123	R4822 126 10002	100	nF	25V	
2124	R4822 126 10002	100	nF	25V	
2125	R4822 122 33515	82	pF	63V	
2126	R5322 122 31946	27	pF	63V	
2128	R4822 122 33515	82	pF	63V	
2129	R4822 122 33515	82	pF	63V	
2130	R4822 122 33575	220	pF	50V	
2132	R5322 122 32269	6,8	pF	50V	
2133	R5322 122 32452	47	pF	63V	
2134	R4822 122 33575	220	pF	50V	
2135	R5322 122 31946	27	pF	63V	
2137	R4822 116 10056	VDR 0805 1MA/ 8VMAX			
2138	R4822 116 10056	VDR 0805 1MA/ 8VMAX			
150	R4822 122 33177	10	nF	50V	
2151	R4822 126 13061	220	nF	25V	
2152	R4822 124 11568	47	µF	16V	
2153	R5322 122 32654	22	nF	63V	
2154	R4822 122 33177	10	nF	50V	
2155	R4822 122 33177	10	nF	50V	
2156	R4822 122 33177	10	nF	50V	
2157	R4822 122 33177	10	nF	50V	
2158	R4822 122 33177	10	nF	50V	
2159	R4822 122 33177	10	nF	50V	
2160	R4822 122 33177	10	nF	50V	
2161	R4822 122 33177	10	nF	50V	
2163	R5322 122 32531	100	pF	50V	
2203	R5322 122 32481	15	pF	50V	
2204	R5322 122 32481	15	pF	50V	
2210	R4822 122 33177	10	nF	50V	
2211	R4822 124 81112	220	µF	10V	
2212	R4822 126 13061	220	nF	25V	
2220	R4822 124 23055	22	µF	16V	
2230	R4822 122 33177	10	nF	50V	
2231	R4822 122 33797	47	nF	50V	
2232	R4822 122 33177	10	nF	50V	
2233	R4822 122 33177	10	nF	50V	
2251	R4822 126 10002	100	nF	25V	
2252	R4822 126 10002	100	nF	25V	
2297	R4822 124 11968	220	µF	5,5V	
2300	R4822 124 80407	1	µF	50V	
2301	R4822 124 80407	1	µF	50V	
2302	R4822 124 80407	1	µF	50V	
2308	R5322 122 32531	100	pF	50V	
2310	R4822 126 10002	100	nF	25V	
2311	R4822 122 33177	10	nF	50V	
2313	R4822 122 33575	220	pF	50V	
2314	R4822 126 10002	100	nF	25V	
2315	R4822 122 33177	10	nF	50V	
2316	R4822 122 33797	47	nF	50V	
2317	R5322 122 32654	22	nF	63V	
2318	R4822 124 22263	220	µF	25V	
2319	R5322 122 32654	22	nF	63V	
2320	R5322 122 32654	22	nF	63V	
2350	R4822 126 14125	470	pF		
2353	R4822 126 10002	100	nF	25V	
2355	R5322 122 34123	1	nF	50V	
2356	R4822 124 23053	1	µF	63V	
2357	R4822 126 13841	1	nF	250V	
2359	R4822 126 13061	220	nF	25V	
2360	R4822 121 10667	68	nF	275V	
2361	R4822 124 22864	47	µF	50V	
2362	R4822 124 11969	22	µF	400V	
2363	R4822 124 22864	47	µF	50V	
2364	R4822 124 11899	220	µF	25V	
2365	R4822 124 11994	470	µF	16V	
2366	R4822 126 14126	47	pF	2KV	
2367	R4822 124 11899	220	µF	25V	
2368	R4822 122 31175	1	nF	500V	
2369	R4822 126 10002	100	nF	25V	
2370	R4822 124 23052	100	µF	16V	
2371	R4822 124 11994	470	µF	16V	
2372	R4822 126 13061	220	nF	25V	
2373	R4822 124 11486	220	µF	16V	
2374	R4822 124 11994	470	µF	16V	
2375	R4822 121 42004	10	nF	400V	
2376	R4822 124 22833	10	µF	50V	
2378	R4822 121 42004	10	nF	400V	
2379	R5322 126 10223	4,7	nF	63V	
2385	R4822 124 11486	220	µF	16V	
2386	R5322 122 32268	470	pF	50V	
2400	R4822 122 33177	10	nF	50V	
2401	R4822 124 23055	22	µF	16V	
2403	R5322 122 32658	22	pF	50V	
2404	R5322 122 32658	22	pF	50V	
2416	R4822 126 10002	100	nF	25V	
2417	R4822 124 81295	47	µF	6,3V	
2440	R4822 124 81029	100	µF	25V	
2441	R4822 126 10002	100	nF	25V	
2442	R4822 122 33177	10	nF	50V	
2455	R4822 122 33175	2,2	nF	50V	
2459	R4822 124 22263	220	µF	25V	
2461	R5322 126 10223	4,7	nF	63V	
2463	R4822 124 23027	47	µF	6.3V	
2464	R5322 126 10223	4,7	nF	63V	
2465	R4822 122 33175	2,2	nF	50V	
2466	R4822 124 23027	47	µF	6 3V	
2467	R4822 122 33342	33	nF	63V	
2468	R4822 126 10002	100	nF	25V	
2470	R4822 122 33177	10	nF	50V	
2472	R5322 122 32531	100	pF	50V	
2473	R5322 122 32531	100	pF	50V	
2474	R5322 122 32531	100	pF	50V	
2501	R4822 126 10002	100	nF	25V	
2502	R4822 124 22826	10	µF	16V	
2503	R4822 124 22826	10	µF	16V	
2504	R4822 116 10056	VDR 0805 1MA/ 8V MAX			for stereo
2504	R5322 122 32268	470pF		50V	for mono
2505	R5322 122 32268	470pF		50V	for mono
2505	R4822 116 10056	VDR 0805 1MA/ 8V MAX			for stereo
2506	R4822 116 10056	VDR 0805 1MA/ 8V MAX			for stereo
2506	R5322 122 32268	470pF		50V	for mono
2507	R4822 116 10056	VDR 0805 1MA/ 8V MAX			
2508	R4822 126 10002	100nF		25V	
2509	R5322 122 32268	470pF		50V	for mono
2509	R4822 116 10056	VDR 0805 1MA/ 8V MAX			for stereo
2510	R5322 122 32268	470pF		50V	for mono
2510	R4822 116 10056	VDR 0805 1MA/ 8V MAX			for stereo
2511	R4822 116 10056	VDR 0805 1MA/ 8V MAX			for stereo
2511	R5322 122 32268	470pF		50V	for mono
2512	R4822 116 10056	VDR 0805 1MA/ 8V MAX			
2514	R4822 124 23027	47	µF	6 3V	
2515	R4822 126 10002	100	nF	25V	
2516	R4822 124 11568	47	µF	16V	
2517	R4822 126 10002	100	nF	25V	
2519	R4822 126 10002	100	nF	25V	
2520	R4822 126 10002	100	nF	25V	
2523	R4822 126 10002	100	nF	25V	
2524	R4822 126 10002	100	nF	25V	
2525	R4822 126 10002	100	nF	25V	
2526	R4822 126 10002	100	nF	25V	
2527	R4822 126 10002	100	nF	25V	
2528	R4822 126 10002	100	nF	25V	
2530	R4822 126 13061	220	nF	25V	
2540	R4822 126 10002	100	nF	25V	
2541	R4822 122 33175	2,2	nF	50V	
2542	R4822 122 33342	33	nF	63V	
2543	R4822 126 13482	470	nF	16V	
2545	R4822 126 10002	100	nF	25V	
2600	R5322 126 10184	680	pF		
2601	R4822 122 33175	2,2	nF	50V	
2602	R4822 124 22826	10	µF	16V	
2603	R4822 122 33177	10	nF	50V	
2604	R4822 124 22833	10	µF	50V	for stereo
2604	R4822 124 22739	100	µF	50V	for mono
2605	R5322 122 34123	1	nF	50V	
2606	R4822 126 10002	100	nF	25V	
2608	R4822 122 33177	10	nF	50V	
2617	R4822 124 11568	47	µF	16V	
2618	R5322 122 31863	330	pF	50V	
2619	R4822 124 11568	47	µF	16V	
2620	R4822 121 51655	47	nF	50V	
2621	R5322 122 34123	1	nF	50V	
2622	R4822 121 43873	27	nF	50V	
2647	R4822 126 10002	100	nF	25V	
2648	R4822 124 23055	22	µF	16V	

⚠. Safety component, use only this type

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2650	R4822 126 10002	100	nF	25V
2651	R4822 124 11568	47	µF	16V
2652	R4822 124 22826	10	µF	16V
2656	R4822 126 14127	39	nF	
2657	R4822 122 33128	15	nF	63V
2700	R4822 126 10002	100	nF	25V
2701	R4822 126 10002	100	nF	25V
2702	R4822 126 10002	100	nF	25V
2704	R4822 124 23052	100	µF	16V
2705	R5322 122 32268	470	pF	50V
2706	R4822 122 33575	220	pF	50V
2707	R5322 122 33861	120	pF	50V
2708	R4822 124 23055	22	µF	16V
2715	R5322 122 32661	56	pF	50V
2716	R5322 122 32661	56	pF	50V
2722	R5322 122 34123	1	nF	50V
2726	R4822 126 12104	12	nF	63V
2727	R4822 124 23055	22	µF	16V
2728	R4822 124 23055	22	µF	16V
2729	R4822 122 33177	10	nF	50V
2730	R5322 122 32452	47	pF	63V
2731	R5322 122 32452	47	pF	63V
2732	R5322 122 32452	47	pF	63V
2733	R4822 122 33177	10	nF	50V
2734	R4822 126 10002	100	nF	25V
2740	R4822 124 41576	2,2	µF	50V
2741	R4822 126 10002	100	nF	25V
2742	R4822 124 23055	22	µF	16V
2743	R4822 126 13061	220	nF	25V
2744	R4822 124 40786	2,2	µF	63V
2745	R4822 122 33575	220	pF	50V
2746	R4822 126 10002	100	nF	25V
2747	R4822 126 10002	100	nF	25V
2748	R4822 126 12945	8,2	pF	
2749	R4822 126 13061	220	nF	25V
2750	R4822 124 40786	2,2	µF	63V
2752	R4822 126 13061	220	nF	25V
2780	R4822 124 22826	10	µF	16V
2781	R4822 122 33177	10	nF	50V
2782	R4822 126 10002	100	nF	25V
2783	R5322 126 10184	680	pF	
2784	R4822 124 11568	47	µF	16V
2785	R5322 122 32531	100	pF	50V
2786	R4822 124 11569	4,7	µF	25V
2787	R4822 124 11569	4,7	µF	25V
2788	R5322 122 32654	22	nF	63V
2789	R4822 122 33177	10	nF	50V
2790	R4822 122 33177	10	nF	50V
2791	R4822 124 11569	4,7	µF	25V
2792	R4822 124 11569	4,7	µF	25V
2793	R5322 122 32481	15	pF	50V
2794	R4822 126 10002	100	nF	25V
2795	R5322 122 34123	1	nF	50V
2796	R4822 124 11569	4,7	µF	25V
2800	R4822 126 13689	18	pF	63V
2801	R5322 122 32659	33	pF	50V
2802	R4822 126 14118	100	nF	Y5V
2803	R4822 126 10002	100	nF	25V
2804	R4822 124 23053	1	µF	63V
2805	R4822 124 23027	47	µF	6,3V
2810	R5322 122 33861	120	pF	50V
2811	R5322 122 32531	100	pF	50V
2831	R5322 122 32481	15	pF	50V
2850	R4822 124 23052	100	µF	16V
2851	R5322 122 32654	22	nF	63V
2852	R4822 124 23052	100	µF	16V
2853	R5322 122 32654	22	nF	63V
2854	R4822 124 40786	2,2	µF	63V
2855	R5322 122 32654	22	nF	63V
2856	R5322 122 32654	22	nF	63V
2857	R4822 126 13061	220	nF	25V
2858	R4822 126 13061	220	nF	25V
2859	R4822 126 13061	220	nF	25V
2860	R4822 126 13061	220	nF	25V
2861	R4822 126 13061	220	nF	25V
2862	R4822 126 13061	220	nF	25V
2863	R4822 126 13061	220	nF	25V
2864	R4822 126 13061	220	nF	25V
2865	R5322 126 10223	4,7	nF	63V
2866	R4822 124 11568	47	µF	16V
2867	R4822 124 22826	10	µF	16V
2868	R4822 126 13061	220	nF	25V
2869	R5322 126 10223	4,7	nF	63V
2870	R4822 124 11568	47	µF	16V
2871	R4822 124 22826	10	µF	16V
2872	R4822 124 22826	10	µF	16V
2873	R4822 124 22826	10	µF	16V
2874	R4822 124 22826	10	µF	16V
2875	R4822 124 22826	10	µF	16V
2876	R4822 124 22826	10	µF	16V
2877	R4822 124 22826	10	µF	16V
2878	R4822 126 13061	220	nF	25V
2879	R4822 126 13061	220	nF	25V

RESISTORS

3000	R4822 051 10102	1	k	0,25W	
3001	R4822 051 10102	1	k	0,25W	
3002	R4822 116 52228	680	R	0,5W	
3003	R4822 116 52228	680	R	0,5W	
3004	R4822 116 52228	680	R	0,5W	
3005	R4822 116 52303	8,2	k	0,5W	
3006	R4822 116 52238	12	k	0,5W	
3007	R4822 100 12157	10	k	POT	
3008	R4822 116 83883	470	R	0,5W	
3010	R4822 051 10102	1	k	0,25W	
3011	R4822 117 11449	2,2	k	0,1W	
3012	R4822 117 11449	2,2	k	0,1W	
3013	R4822 117 11721	1,3	k	0 1W	
3014	R4822 116 83903	4,7	k	0.1W	
3015	R4822 051 10102	1	k	0,25W	
3016	R4822 051 20822	8,2	k	0,1W	
3017	R4822 116 52249	1,8	k	0,5W	
3018	R4822 116 83883	470	R	0,5W	
3019	R4822 051 20562	5,6	k	0,1W	
3020	R4822 051 20224	220	k	0,1W	
3021	R4822 050 11002	1	k	0,4W	
3022	R4822 050 11002	1	k	0,4W	
3024	R4822 051 20822	8,2	k	0,1W	
3024	R4822 051 20682	6,8	k	0,1W	for 2/x
3027	R4822 116 52264	27	k	0,5W	
3028	R4822 051 20332	3,3	k	0,1W	
3029	R4822 051 20225	2,2	M	0,1W	
3030	R4822 116 52256	2,2	k	0,5W	
3031	R4822 116 52256	2,2	k	0,5W	
3032	R4822 117 11449	2,2	k	0,1W	
3033	R4822 116 52251	18	k	0,5W	
3034	R4822 051 20153	15	k	0,1W	
3035	R4822 117 11449	2,2	k	0,1W	
3036	R4822 051 20471	470	R	0,1W	
3045	R4822 116 83876	270	R	0,5W	
3046	R4822 050 11002	1	k	0,4W	
3048	R4822 116 83884	47	k	0,5W	
3050	R4822 116 83872	220	R	0,5W	
3050	R4822 116 52175	100	R	0,5W	
3051	R4822 051 20224	220	k	0,1W	
3052	R4822 116 52175	100	R	0,5W	
3054	R4822 117 11449	2,2	k	0,1W	
3055	R4822 117 10361	680	R	0,1W	
3080	R4822 051 20568	5,6	R	0,1W	
3081	R4822 051 20561	560	R	0,1W	
3082	R4822 051 20101	100	R	0,1W	
3083	R4822 051 20472	4,7	k	0,1W	
3084	R4822 051 20472	4,7	k	0,1W	
3085	R4822 051 20112	1,1	k	0,1W	
3086	R4822 051 20331	330	R	0,1W	
3087	R4822 116 52234	100	k	0,5W	
3100	R4822 116 52219	330	R	0,5W	
3101	R4822 051 20332	3,3	k	0,1W	
3102	R4822 116 52231	820	R	0,5W	
3103	R4822 116 52228	680	R	0,5W	
3104	R4822 050 11002	1	k	0,4W	
3105	R4822 116 52222	390	R	0,5W	
3106	R4822 116 52231	820	R	0,5W	
3107	R4822 050 11002	1	k	0,4W	
3109	R4822 116 52195	47	R	0,5W	
3110	R4822 116 52207	1,2	k	0,5W	
3111	R4822 116 52256	2,2	k	0,5W	
3112	R4822 051 10102	1	k	0,25W	
3113	R4822 051 20561	560	R	0,1W	
3114	R4822 117 10833	10	k	0,1W	

⚠ . Safety component, use only this type

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3115	R4822 116 52251	18	k	0,5W	
3116	R4822 051 10102	1	k	0,25W	
3117	R4822 116 52256	2,2	k	0,5W	
3118	R4822 116 52283	4,7	k	0,5W	
3119	R4822 051 20333	33	k	0,1W	
3120	R4822 116 52303	8,2	k	0,5W	
3121	R4822 051 20182	1,8	k	0,1W	
3122	R4822 051 10102	1	k	0,25W	
3123	R4822 116 83864	10	k	0,5W	
3124	R4822 116 52243	1,5	k	0,5W	
3125	R4822 117 11449	2,2	k	0,1W	
3126	R4822 051 10102	1	k	0,25W	
3127	R4822 117 11449	2,2	k	0,1W	
3128	R4822 117 11449	2,2	k	0,1W	
3129	R4822 051 10102	1	k	0,25W	
3134	R4822 117 11503	220	R	0 1W	
3135	R4822 117 11503	220	R	0 1W	
3151	R4822 051 20104	100	k	0,1W	
3152	R4822 051 20393	39	k	0,1W	
3153	R4822 117 10833	10	k	0,1W	
3154	R4822 117 10354	22	k	0,1W	for 4/0
3154	R4822 117 12342	18, 1k		0,1W	for 2/x
3154	R4822 117 12605	27, 1k		0,1W	for 4/2
3155	R4822 117 11383	12	k	0,1W	
3156	R4822 051 20331	330	R	0,1W	
3157	R4822 051 20331	330	R	0,1W	
3158	R4822 051 20472	4,7	k	0,1W	
3159	R4822 100 12157	10	k	POT	
3160	R4822 100 12157	10	k	POT	
3162	R4822 051 20008	0	R	0,1W	
3164	R4822 051 20008	0	R	0,1W	
3228	R4822 116 83872	220	R	0,5W	
3229	R4822 117 10833	10	k	0,1W	
3230	R4822 117 10833	10	k	0,1W	
3231	R4822 116 52175	100	R	0,5W	
3232	R4822 116 52175	100	R	0,5W	
3233	R4822 116 83864	10	k	0,5W	
3234	R4822 116 83864	10	k	0,5W	
3235	R4822 116 83864	10	k	0,5W	
3238	R4822 116 83864	10	k	0,5W	
3240	R4822 116 52297	68	k	0,5W	
3244	R4822 050 11002	1	k	0,4W	
3245	R4822 051 20183	18	k	0,1W	
3250	R4822 051 20153	15	k	0,1W	
3252⚠	R4822 117 11593	22	R		
3253	R4822 050 24708	4,7	R	0,6W	
3254	R4822 050 24708	4,7	R	0,6W	
3265	R4822 116 83864	10	k	0,5W	
3270	R4822 117 11503	220	R	0 1W	
3271	R4822 117 11503	220	R	0 1W	
3273	R4822 117 11503	220	R	0 1W	
3297	R4822 051 20562	5,6	k	0,1W	
3300	R4822 116 52175	100	R	0,5W	
3301	R4822 116 52175	100	R	0,5W	
3302	R4822 116 52175	100	R	0,5W	
3303	R4822 116 83883	470	R	0,5W	
3304	R4822 050 11002	1	k	0,4W	
3305	R4822 116 52283	4,7	k	0,5W	
3312	R4822 116 52249	1,8	k	0,5W	
3313	R4822 116 83884	47	k	0,5W	
3350	R4822 117 10833	10	k	0,1W	
3351	R4822 051 20223	22	k	0,1W	
3352	R4822 051 20562	5,6	k	0,1W	
3353	R4822 117 10833	10	k	0,1W	
3354	R4822 117 11449	2,2	k	0,1W	
3355	R4822 051 20822	8,2	k	0,1W	
3356	R4822 051 20223	22	k	0,1W	
3357	R4822 051 20472	4,7	k	0,1W	
3358	R4822 117 11149	82	k	0,1W	
3359	R4822 051 20471	470	R	0,1W	
3360	R4822 051 20689	68	R	0,1W	
3361⚠	R4822 052 10479	47	R	0,33W	
3362	R4822 051 20472	4,7	k	0,1W	
3363	R4822 050 21208	1,2	R	0,6W	
3365	R4822 116 83874	220	k	0,5W	
3369	R4822 116 83882	39	k	0,5W	
3370	R4822 116 83882	39	k	0,5W	
3374	R4822 051 20271	270	R	0,1W	
3375	R4822 051 10102	1	k	0,25W	
3376	R4822 051 20008	0	R	0,1W	
3377	R4822 051 20472	4,7	k	0,1W	
3378	R4822 051 20272	2,7	k	0,1W	
3379	R4822 101 11383	470, 3		R	
3383	R4822 116 83874	220	k	0,5W	
3384⚠	R4822 052 10101	100	R	0,33W	
3385	R4822 116 52269	3,3	k	0,5W	
3386	R4822 116 52219	330	R	0,5W	
3387	R4822 050 11002	1	k	0,4W	
3388	R4822 050 11002	1	k	0,4W	
3389	R4822 117 11449	2,2	k	0,1W	
3392⚠	R4822 053 21335	3,3	M	0,5W	
3393⚠	R4822 053 21335	3,3	M	0,5W	
3394	R4822 116 52256	2,2	k	0,5W	
3395	R4822 116 52257	22	k	0,5W	
3396	R4822 116 52257	22	k	0,5W	
3400	R4822 116 83864	10	k	0,5W	
3401	R4822 116 83864	10	k	0,5W	
3402	R4822 050 11002	1	k	0,4W	
3403	R4822 116 52256	2,2	k	0,5W	
3404	R4822 116 83864	10	k	0,5W	
3405	R4822 116 83876	270	R	0,5W	
3406	R4822 116 83864	10	k	0,5W	
3407	R4822 116 83864	10	k	0,5W	
3408	R4822 116 52256	2,2	k	0,5W	
3410	R4822 051 20472	4,7	k	0,1W	
3411	R4822 116 83864	10	k	0,5W	
3412	R4822 116 52249	1,8	k	0,5W	
3413	R4822 050 11002	1	k	0,4W	
3414⚠	R4822 052 10109	10	R	0,33W	
3415⚠	R4822 052 10109	10	R	0,33W	
3416	R4822 116 52257	22	k	0,5W	
3417	R4822 116 52283	4,7	k	0,5W	
3418	R4822 050 11002	1	k	0,4W	
3419	R4822 051 20472	4,7	k	0,1W	
3420	R4822 117 10833	10	k	0,1W	
3421	R4822 116 83864	10	k	0,5W	
3423	R4822 116 83876	270	R	0,5W	
3424	R4822 116 52256	2,2	k	0,5W	
3430	R4822 116 52249	1,8	k	0,5W	
3431	R4822 116 52276	3,9	k	0,5W	
3432	R4822 116 83864	10	k	0,5W	
3433	R4822 116 52256	2,2	k	0,5W	
3434	R4822 116 52257	22	k	0,5W	
3435	R4822 116 83864	10	k	0,5W	
3436	R4822 050 11002	1	k	0,4W	
3437	R4822 116 83961	6,8	k		
3438	R4822 051 20472	4,7	k	0,1W	
3440⚠	R4822 052 10228	2,2	R	0,33W	
3441	R4822 116 80176	1	R	0,5W	
3442	R4822 116 52304	82	k	0,5W	
3443	R4822 116 52257	22	k	0,5W	
3444	R4822 116 52276	3,9	k	0,5W	
3445	R4822 116 83864	10	k	0,5W	
3446	R4822 116 52257	22	k	0,5W	
3447	R4822 116 52257	22	k	0,5W	
3448	R4822 116 83864	10	k	0,5W	
3449	R4822 117 10833	10	k	0,1W	
3450	R4822 116 52256	2,2	k	0,5W	
3451	R4822 116 83864	10	k	0,5W	
3452	R4822 116 52263	2,7	k	0,5W	
3453	R4822 116 52283	4,7	k	0,5W	
3454	R4822 116 52283	4,7	k	0,5W	
3455	R4822 116 52283	4,7	k	0,5W	
3456	R4822 117 10833	10	k	0,1W	
3457	R4822 050 11002	1	k	0,4W	
3458	R4822 051 20223	22	k	0,1W	
3459	R4822 116 83876	270	R	0,5W	
3460	R4822 116 83884	47	k	0,5W	
3461	R4822 051 20472	4,7	k	0,1W	
3462	R4822 051 20563	56	k	0,1W	
3463	R4822 116 52283	4,7	k	0,5W	
3464	R4822 116 52256	2,2	k	0,5W	
3466	R4822 116 83864	10	k	0,5W	
3469	R4822 116 83876	270	R	0,5W	
3470	R4822 116 52264	27	k	0,5W	
3471	R4822 116 52222	390	R	0,5W	
3472	R4822 116 52264	27	k	0,5W	
3473	R4822 116 52222	390	R	0,5W	
3474	R4822 116 83864	10	k	0,5W	
3475	R4822 116 52289	5,6	k	0,5W	
3476	R4822 116 52222	390	R	0,5W	

⚠ Safety component, use only this type

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3477	R4822 116 52283	4,7	k	0,5W	
3478	R4822 051 20104	100	k	0,1W	
3479	R4822 116 52283	4,7	k	0,5W	
3480	R4822 116 83884	47	k	0,5W	
3481	R4822 116 52256	2,2	k	0,5W	
3482	R4822 116 52257	22	k	0,5W	
3483	R4822 116 83864	10	k	0,5W	
3484	R4822 116 52283	4,7	k	0,5W	
3488	R4822 051 20471	470	R	0,1W	
3489	R4822 116 52283	4,7	k	0,5W	
3490	R4822 116 83872	220	R	0,5W	
3491	R4822 116 83884	47	k	0,5W	
3492	R4822 051 20473	47	k	0,1W	
3493	R4822 051 20225	2,2	M	0,1W	
3495	R4822 051 20104	100	k	0,1W	
3496	R4822 051 20472	4,7	k	0,1W	
3498	R4822 051 20472	4,7	k	0,1W	
3499	R4822 116 52283	4,7	k	0,5W	
3501	R4822 051 10102	1	k	0,25W	
3502	R4822 051 10102	1	k	0,25W	
3505	R4822 051 20759	75	R	0,1W	
3512	R4822 051 20682	6,8	k	0,1W	
3513	R4822 116 83872	220	R	0,5W	
3514	R4822 116 83961	6,8	k		
3515	R4822 051 20682	6,8	k	0,1W	
3516	R4822 117 11503	220	R	0.1W	
3517	R4822 116 52234	100	k	0,5W	
3518	R4822 116 52234	100	k	0,5W	
3519	R4822 051 20822	8,2	k	0,1W	
3520	R4822 117 10353	150	R	0,1W	
3521	R4822 116 83961	6,8	k		
3522	R4822 051 20821	820	R	0,1W	
3523	R4822 051 20008	0	R	0,1W	
3524	R4822 051 20759	75	R	0,1W	
3525	R4822 051 20822	8,2	k	0,1W	
3526	R4822 117 11449	2,2	k	0,1W	
3527	R4822 051 20472	4,7	k	0,1W	
3528	R4822 116 83884	47	k	0,5W	
3529	R4822 051 20759	75	R	0,1W	
3530	R4822 051 20472	4,7	k	0,1W	
3531	R4822 051 20101	100	R	0,1W	
3532	R4822 051 20101	100	R	0,1W	
3533	R4822 051 20759	75	R	0,1W	
3534	R4822 051 20008	0	R	0,1W	
3535	R4822 117 11503	220	R	0.1W	
3536	R4822 117 11503	220	R	0.1W	
3537	R4822 116 83872	220	R	0,5W	
3538	R4822 116 83961	6,8	k		
3539	R4822 116 83961	6,8	k		
3540	R4822 117 11503	220	R	0.1W	
3542	R4822 117 11503	220	R	0.1W	
3544	R4822 117 11503	220	R	0.1W	
3545	R4822 116 52256	2,2	k	0,5W	
3546	R4822 116 52256	2,2	k	0,5W	
3548	R4822 051 20682	6,8	k	0,1W	
3549	R4822 051 20101	100	R	0,1W	
3550	R4822 051 20105	1	M	0,1W	
3551	R4822 051 20105	1	M	0,1W	
3552	R4822 051 20682	6,8	k	0,1W	
3553	R4822 051 20101	100	R	0,1W	
3554	R4822 051 20101	100	R	0,1W	
3555	R4822 051 20008	0	R	0,1W	
3556	R4822 051 20474	470	k	0,1W	
3557	R4822 051 20104	100	k	0,1W	
3560	R4822 051 20008	0	R	0,1W	
3561	R4822 051 20472	4,7	k	0,1W	
3562	R4822 051 20473	47	k	0,1W	
3563	R4822 051 20822	8,2	k	0,1W	
3570	R4822 116 83864	10	k	0,5W	
3600	R4822 116 52257	22	k	0,5W	
3601	R4822 117 10833	10	k	0,1W	
3602	R4822 051 20472	4,7	k	0,1W	
3603	R4822 051 20101	100	R	0,1W	
3604	R4822 116 52257	22	k	0,5W	
3605	R4822 117 11449	2,2	k	0,1W	
3606	R4822 116 52195	47	R	0,5W	
3607	R4822 051 20394	390	k	0,1W	
3608	R4822 117 11383	12	k	0,1W	
3609	R4822 051 20822	8,2	k	0,1W	
3610	R4822 117 11449	2,2	k	0,1W	
3611	R4822 051 20101	100	R	0,1W	for mono
3611	R4822 051 20681	680	R	0,1W	for stereo
3612	R4822 117 11449	2,2	k	0,1W	
3615	R4822 051 20101	100	R	0,1W	
3618	R4822 100 12159	100	k	POT	
3619	R4822 051 20158	1,5	R	0,1W	
3620	R4822 051 20473	47	k	0,1W	
3622	R4822 051 20335	3,3	M	0,1W	
3623	R4822 117 10833	10	k	0,1W	
3624	R4822 051 20332	3,3	k	0,1W	
3625	R4822 051 20339	33	R	0,1W	
3626	R4822 051 20224	220	k	0,1W	
3627	R4822 051 20563	56	k	0,1W	
3638	R4822 051 20109	10	R	0,1W	
3655	R4822 051 20681	680	R	0,1W	
3656	R4822 116 83961	6,8	k		
3657	R4822 051 20391	390	R	0,1W	
3702	R4822 051 20101	100	R	0,1W	
3703	R4822 051 20101	100	R	0,1W	
3704	R4822 051 20681	680	R	0,1W	
3705	R4822 051 20223	22	k	0,1W	
3706	R4822 051 20681	680	R	0,1W	
3707	R4822 051 20101	100	R	0,1W	
3708	R4822 051 20101	100	R	0,1W	
3709	R4822 051 20101	100	R	0,1W	
3723	R4822 051 20224	220	k	0,1W	
3725	R4822 051 20822	8,2	k	0,1W	
3726	R4822 051 20273	27	k	0,1W	
3729	R4822 051 20391	390	R	0,1W	
3730	R4822 051 20183	18	k	0,1W	
3731	R4822 051 20183	18	k	0,1W	
3732	R4822 051 20391	390	R	0,1W	
3735	R4822 051 20391	390	R	0,1W	
3735	R4822 117 11448	180	R	0,1W	for mono SEC
3736	R4822 051 20562	5,6	k	0,1W	
3737	R4822 051 20392	3,9	k	0,1W	
3739	R4822 051 20681	680	R	0,1W	
3742	R4822 100 12158	22	k		
3744	R4822 051 20154	150	k	0,1W	
3747	R4822 051 20331	330	R	0,1W	for PAL
3747	R4822 051 20391	390	R	0,1W	for SEC
3748	R4822 100 12156	4,7	k	POT	for PLL adj
3748	R4822 100 12158	22	k	POT	for Bd. 1 adj.
3749	R4822 051 20681	680	R	0,1W	
3750	R4822 051 20331	330	R	0,1W	
3760	R4822 051 10102	1	k	0,25W	
3760	R4822 051 20821	820	R	0,1W	for PAL I
3761	R4822 051 10102	1	k	0,25W	
3762	R4822 051 10102	1	k	0,25W	
3764	R4822 051 20821	820	R	0,1W	for SECAM
3764	R4822 051 10102	1	k	0,25W	for PAL
3765	R4822 051 20562	5,6	k	0,1W	
3766	R4822 051 20473	47	k	0,1W	
3767	R4822 051 20472	4,7	k	0,1W	
3768	R4822 051 20104	100	k	0,1W	
3769	R4822 051 20472	4,7	k	0,1W	
3770	R4822 051 20104	100	k	0,1W	
3771	R4822 051 20472	4,7	k	0,1W	
3772	R4822 051 20104	100	k	0,1W	
3780	R4822 051 20101	100	R	0,1W	
3781	R4822 051 20101	100	R	0,1W	
3782	R4822 051 20333	33	k	0,1W	
3790	R4822 051 20472	4,7	k	0,1W	
3791	R4822 051 20562	5,6	k	0,1W	
3792	R4822 051 20472	4,7	k	0,1W	
3793	R4822 051 20562	5,6	k	0,1W	
3807	R4822 051 20479	47	R	0,1W	
3808	R4822 051 20479	47	R	0,1W	
3813	R4822 051 20472	4,7	k	0,1W	
3815	R4822 117 10833	10	k	0,1W	
3816	R4822 117 10833	10	k	0,1W	
3817	R4822 117 10833	10	k	0,1W	
3828	R4822 117 10833	10	k	0,1W	
3829	R4822 051 20008	0	R	0,1W	
3850	R4822 117 12708	39,1	k		
3851	R4822 051 20473	47	k	0,1W	
3852	R4822 051 20392	3,9	k	0,1W	
3853	R4822 051 20473	47	k	0,1W	
3854	R4822 051 20392	3,9	k	0,1W	
3855	R4822 051 20104	100	k	0,1W	
3856	R4822 051 20104	100	k	0,1W	
3857	R4822 051 20335	3,3	M	0,1W	

⚠ .. Safety component, use only this type

Motherboard QMB PAL, SECAM, MONO, STEREO

3860	R4822 051 20101	100	R	0,1W
3861	R4822 051 20101	100	R	0,1W
3862	R4822 051 20104	100	k	0,1W
3863	R4822 051 20104	100	k	0,1W
3901	R4822 051 20008	0	R	0,1W
3902	R4822 051 20008	0	R	0,1W
3903	R4822 051 20008	0	R	0,1W
3905	R4822 051 20008	0	R	0,1W
3906	R4822 051 20008	0	R	0,1W
3907	R4822 051 20008	0	R	0,1W
3908	R4822 051 20008	0	R	0,1W
3910	R4822 051 20008	0	R	0,1W
3911	R4822 051 20008	0	R	0,1W
3912	R4822 051 20008	0	R	0,1W
3913	R4822 051 20008	0	R	0,1W
3915	R4822 051 20008	0	R	0,1W
3916	R4822 051 20008	0	R	0,1W
3917	R4822 051 20008	0	R	0,1W
3918	R4822 051 20008	0	R	0,1W
3919	R4822 051 20008	0	R	0,1W
3922	R4822 051 20008	0	R	0,1W
3923	R4822 051 20008	0	R	0,1W
3924	R4822 051 20008	0	R	0,1W
3925	R4822 051 20008	0	R	0,1W
3926	R4822 051 20008	0	R	0,1W
3927	R4822 051 20008	0	R	0,1W
3928	R4822 051 20008	0	R	0,1W
3929	R4822 051 20008	0	R	0,1W
3930	R4822 051 20008	0	R	0,1W
3931	R4822 051 20008	0	R	0,1W
3941	R4822 051 20008	0	R	0,1W
3942	R4822 051 20008	0	R	0,1W
3943	R4822 051 20008	0	R	0,1W
3944	R4822 051 20008	0	R	0,1W
3945	R4822 051 20008	0	R	0,1W
3946	R4822 051 20008	0	R	0,1W
3947	R4822 051 20008	0	R	0,1W
3950	R4822 051 20008	0	R	0,1W
3951	R4822 051 20008	0	R	0,1W
3956	R4822 051 20008	0	R	0,1W
3960	R4822 051 20008	0	R	0,1W
3961	R4822 051 20008	0	R	0,1W
3962	R4822 051 20008	0	R	0,1W
3965	R4822 051 20008	0	R	0,1W
3966	R4822 051 20008	0	R	0,1W
3967	R4822 051 20008	0	R	0,1W
3970	R4822 051 20008	0	R	0,1W
3972	R4822 051 20008	0	R	0,1W
3973	R4822 051 20008	0	R	0,1W
3984	R4822 051 20008	0	R	0,1W
3985	R4822 051 20008	0	R	0,1W
3986	R4822 051 20008	0	R	0,1W
3988	R4822 051 20008	0	R	0,1W
3989	R4822 051 20008	0	R	0,1W
3990	R4822 051 20008	0	R	0,1W
3998	R4822 051 20008	0	R	0,1W
3999	R4822 051 20008	0	R	0,1W
4523	R4822 117 10833	10	K	0,1W
4591	R4822 117 12708	39	K	0,1W
4659	R4822 051 20182	1,8	K	0,1W
4671	R4822 051 20472	4,7	K	0,1W
4684	R4822 117 12708	39	K	0,1W
4745	R4822 051 20008	0	R	0,1W
4758	R4822 051 20183	18	K	0,1W
4764	R4822 117 10833	10	K	0,1W
4772	R4822 051 20472	4,7	K	0,1W

COILS

5000	R4822 157 11234	10µH	5%	
5001	R4822 152 20677	10µH	10%	
5002	R4822 152 20677	10µH	10%	
5004	R4822 157 11142	47µH	5%	
5005	R4822 157 11145	150µH	5%	
5020	R4822 157 10972	15µH	5%	
5026	R4822 157 11228	100µH	5%	
5036	R4822 157 11149	56µH	5%	
5080⚠	R4822 157 11226	47µH	5%	
5100	R4822 157 63661	FIL LC VAR 4M286 5VS		
5101	R4822 157 10972	15µH	5%	
5102	R4822 157 11149	56µH	5%	
5103	R4822 157 63661	FIL LC VAR 4M286 5VS		
5104	R4822 157 11227	150µH	5%	
5105	R4822 157 11227	150µH	5%	
5106	R4822 157 11151	330µH	5%	
5107	R4822 157 11228	100µH	5%	
5108	R4822 157 63659	FIL LC VAR 1G072 5V2		
5111	R4822 157 11229	15µH	5%	
5112	R4822 157 10972	15µH	5%	
5113	R4822 157 11145	150µH	5%	
5114	R4822 157 10972	15µH	5%	
5115	R4822 157 63717	6,8µH	10%	
5130	R4822 157 71206	BLM21A10PT		
5150⚠	R4822 157 53906	47µH	10%	
5200	R4822 152 20677	10µH	10%	
5300⚠	R4822 157 53005	0µH33	20%	
5350	R4822 157 51462	10µH	10%	
5351	R4822 157 71461	22µH	10%	
5352⚠	R4822 157 10454	LINE FILTER		
5353⚠	R4822 146 10786	SRW32ES-E01		
5354	R4822 157 51462	10µH	10%	
5355⚠	R4822 157 53005	0µH33	20%	
5358	R4822 157 60147	2,2µH		
5361	R4822 157 52286	22µH		
5368	R4822 157 60147	2,2µH		
5400	R4822 152 20677	10µH		
5402	R4822 152 20677	10µH		
5601	R4822 157 11249	10µH	5%	
5602	R4822 157 11151	330µH	5%	
5603	R4822 157 53531	coil		
5604	R4822 157 11251	3,3µH	10%	
5605	R4822 157 71206	BLM21A10PT		
5700	R4822 157 71206	BLM21A10PT		
5702	R4822 152 20677	10µH	10%	
5703	R4822 152 20677	10µH	10%	
5705	R4822 152 20677	10µH	10%	
5720	R4822 157 11231	LAN02TB1R0J		
5721	R4822 157 70877	H292ONS-6785NK		
5725	R4822 157 70877	H292ONS-6785NK		
5726	R4822 051 20008	0R00 JUMP (0805)		
5740	R4822 157 11232	12µH	5%	for SECAM LL'
5740	R4822 157 11229	15µH	5%	for PAL
5741	R4822 157 11223	39µH	5%	
5780	R4822 157 70038	10µH	10%	
5800	R4822 157 11233	LAN02TB330J		
5801	R4822 152 20677	10µH	10%	
5810	R4822 157 11234	10µH	5%	
5831	R4822 157 11235	LANO2TB220J		

⚠... Safety component, use only this type

Motherboard QMB PAL, SECAM, MONO, STEREO

DIODES

6100	R4822 130 32778	1SS133
6135	R4822 130 34197	BZX79-B12
6250	R4822 130 83514	MTZJ12C
6299	R4822 130 10869	RB441Q
6350	R4822 130 30842	BAV21
6351	R4822 130 31983	BAT85
6352	R4822 130 42488	BYD33D
6353	R4822 130 42488	BYD33D
6354	R4822 130 80858	1N5062
6355	R4822 130 42488	BYD33D
6356	R4822 130 42488	BYD33D
6357	R4822 130 10871	SBYV27-200
6358	R5322 130 31938	BYV27-200
6359	R4822 130 83909	BYW98-200RL
6359	R4822 130 32715	SB340
6360	R4822 130 83147	DF06M
6371	R4822 130 42488	BYD33D
6372	R4822 130 34142	BZX79-B33
6460	R4822 130 10231	SET:2X SENS + 1X LED
6460	R4822 130 10231	SET:2X SENS + 1X LED
6500	R4822 130 34197	BZX79-B12
6501	R4822 130 34197	BZX79-B12
6502	R4822 130 34197	BZX79-B12
6509	R4822 130 83514	MTZJ12C
6510	R4822 130 83514	MTZJ12C
6511	R4822 130 10884	MTZJ18C
6516	R4822 130 34278	BZX79-B6V8
6530	R4822 130 10654	BAT254
6601	R4822 130 30861	BZX79-B7V5
6760	R4822 130 10414	BA792
6761	R4822 130 10414	BA792

TRANSISTORS & IC's

7000	R4822 130 42353	BSF19-F2
7001	R4822 130 10872	MMUN2112L
7002	R4822 130 60511	BC847B
7003	R4822 209 15526	LC89980M
7004	R4822 130 42353	BSF19-F2
7005	R5322 130 60508	BC857B
7006	R4822 130 60511	BC847B
7007	R4822 209 15527	LA71525M
7008	R5322 130 60508	BC857B
7009	R4822 130 10872	MMUN2112L
7011	R4822 130 60511	BC847B
7020	R4822 130 63732	MMUN2212
7021	R5322 130 60508	BC857B
7080	R4822 209 90421	STV5712
7085	R4822 130 60511	BC847B
7100	R4822 130 60511	BC847B
7101	R4822 130 60511	BC847B
7102	R4822 209 73852	PMBT2369
7103	R4822 130 60511	BC847B
7104	R4822 130 63732	MMUN2212
7105	R5322 130 60508	BC857B
7106	R4822 130 60511	BC847B
7110	R4822 209 90189	TDA4722/V2
7150	R4822 209 13121	STV5742
7151	R4822 209 15548	STV5744AD
7153	R4822 130 63732	MMUN2212
7201	R4822 209 15516	TMP87CS71F QDCE1-xP
7201	R4822 209 15517	TMP87CS71F QDCE2-xU
7201	R4822 209 15521	TMP87CS71F QDCH1-xP
7201	R4822 209 15519	TMP87CS71F QDCH2-xU
7201	R4822 209 15573	TMP87CS71F QDCH5-xU
7202	R4822 135 00115	25U39113SA
7203	R4822 212 30842	TFMS5360
7231	R4822 130 63732	MMUN2212
7300	R4822 209 13126	TDA5241
7301	R4822 130 10872	MMUN2112L
7350⚠	R4822 130 63794	STP3NA60
7351⚠	R4822 209 32126	SOC1012T
7352	R4822 209 81397	TL431CLPST
7354	R4822 209 90025	MC44603P
7358	R4822 130 40995	BD438
7359	R4822 130 60511	BC847B
7400	R4822 209 15529	TMP91C642AF QTDP2-xU
7420	R4822 209 81726	MC7812CT for stereo
7420	R4822 209 15628	L4931CV120 for mono
7440	R4822 209 30146	L2722
7455	R4822 130 10872	MMUN2112L
7456	R4822 130 60511	BC847B
7457	R4822 130 60511	BC847B
7458	R4822 130 60511	BC847B
7460	R4822 209 30836	SAA1310/N2
7461	R4822 130 10231	SET:2X SENS + 1X LED
7462	R4822 130 10231	SET:2X SENS + 1X LED
7463	R4822 130 41344	BC337-40
7464	R4822 130 10233	TCRT5000L
7466	R4822 130 10234	TCST1030L
7467	R4822 130 60511	BC847B
7468	R4822 130 60511	BC847B
7469	R4822 130 60511	BC847B
7500	R4822 130 60511	BC847B
7501	R5322 130 60508	BC857B
7505	R4822 130 63732	MMUN2212
7506	R4822 130 10872	MMUN2112L
7507	R4822 209 90016	STV6400
7510	R5322 130 42136	BC848C
7511	R4822 130 42615	BC817-40
7512	R5322 130 42136	BC848C
7513	R5322 209 14481	HEF4053BT
7540	R4822 209 32728	SDA5642 for VPS only
7540	R4822 209 15504	SDA5650 for VPS/PDC
7600	R4822 130 60373	BC856B
7601	R5322 130 60159	BC846B
7602	R5322 130 60159	BC846B
7603	R4822 130 60511	BC847B
7604	R4822 130 41715	BC328-40
7609	R4822 130 42615	BC817-40
7720	R4822 209 90288	TDA9800T/V3
7721	R4822 209 90018	TDA9812T for SECAM mono
7721	R4822 209 90431	TDA9813T/V2 for PAL FM stereo
7721	R4822 209 90452	TDA9814T/V3 for SECAM stereo
7722	R5322 209 14481	HEF4053BT
7723	R5322 130 60508	BC857B
7724	R5322 130 42136	BC848C
7725	R4822 130 60511	BC847B
7726	R4822 130 63732	MMUN2212
7729	R4822 130 60511	BC847B
7730	R4822 130 60511	BC847B
7780	R4822 209 32501	TDA9840T/V2
7800	R4822 209 15524	LC74781-9663
7810	R4822 130 42353	BSF19-F2
7850	R4822 209 15525	TDA9604H/N1
7890	R4822 209 32283	ST24C08CB1

⚠... Safety component, use only this type

QNIC-NICAM, CABLES & SUB MODULS

MISCELLANEOUS

1700	R4822 071 52501	Fuse	250mA
1710	R4822 242 10433	Crystal	8,192MHZ
1970	R4822 265 10943	CONN	11P

CAPACITORS

2700	R4822 122 33172	390	pF	50V
2701	R5322 122 32448	10	pF	50V
2703	R4822 126 10002	100	nF	25V
2704	R4822 122 33575	220	pF	50V
2705	R4822 124 22826	10	µF	16V
2706	R4822 124 22826	10	µF	16V
2707	R4822 126 13061	220	nF	25V
2708	R5322 122 32654	22	nF	63V
2709	R5322 122 32531	100	pF	50V
2710	R5322 122 32531	100	pF	50V
2714	R4822 124 23027	47	µF	6,3V
2716	R4822 124 23027	47	µF	6,3V
2718	R4822 126 10002	100	nF	25V
2719	R4822 122 33175	2,2	nF	50V
2720	R4822 122 33175	2,2	nF	50V
2721	R4822 126 13061	220	nF	25V
2722	R4822 122 33175	2,2	nF	50V
2723	R4822 122 33175	2,2	nF	50V
2725	R4822 124 23053	1	µF	63V
2726	R4822 122 33797	47	nF	50V
2727	R4822 124 23027	47	µF	6,3V
2728	R4822 126 10002	100	nF	25V
2729	R4822 124 22826	10	µF	16V
2731	R4822 124 22826	10	µF	16V
2732	R4822 126 10002	100	nF	25V
2733	R4822 124 23027	47	µF	6,3V
2734	R5322 122 32654	22	nF	63V
2736	R4822 126 10002	100	nF	25V
2752	R4822 126 13061	220	nF	25V
2753	R4822 126 13061	220	nF	25V

RESISTORS

3700	R4822 051 10102	1	k	0,25W
3701	R4822 051 20101	100	R	0,1W
3702	R4822 051 20223	22	k	0,1W
3703	R4822 051 20104	100	k	0,1W
3704	R4822 117 11449	2,2	k	0,1W
3705	R4822 051 20392	3,9	k	0,1W
3707	R4822 116 52276	3,9	k	0,5W
3708	R4822 117 11449	2,2	k	0,1W
3710	R4822 051 20334	330	k	0,1W
3711	R4822 116 52175	100	R	0,5W
3712	R4822 116 52175	100	R	0,5W
3713	R4822 051 20182	1,8	k	0,1W
3714	R4822 051 20333	33	k	0,1W
3715	R4822 117 10833	10	k	0,1W
3720	R4822 117 10833	10	k	0,1W
3721	R4822 117 10833	10	k	0,1W
3722	R4822 117 10833	10	k	0,1W
3723	R4822 117 10833	10	k	0,1W
3790	R4822 051 20008	0	R	0,1W
3792	R4822 051 20008	0	R	0,1W
3793	R4822 051 20008	0	R	0,1W
3794	R4822 051 20008	0	R	0,1W
3795	R4822 051 20008	0	R	0,1W
3796	R4822 051 20008	0	R	0,1W
3797	R4822 051 20008	0	R	0,1W

COILS

5700	R4822 157 63717	6,8µH	10%
5703	R4822 157 71206	BLM21A10PT	
5704	R4822 157 71206	BLM21A10PT	
5705	R4822 157 71206	BLM21A10PT	
5706	R4822 157 71206	BLM21A10PT	
5707	R4822 157 71206	BLM21A10PT	

DIODES

6700	R4822 130 10652	BB149
6701	R4822 130 83757	BAS216

TRANSISTORS & IC's

7700	R4822 209 14809	SAA7284ZP/M2
7701	R5322 209 61487	LM358N

CABLES

8001	R4822 320 11889	FFC TD1-1961
8002	R4822 323 10374	CABLE TREE TD2-1962
8003	R4822 320 11891	FFC TD1-1944
8004	R4822 320 11892	FFC TD4-1930
8006	R3103 140 26420	FFC 1103-1711
8007	R4822 320 11891	FFC 1710-1750
8008	R4822 323 10373	ESD-GND CONN.
⚠	R4822 321 10886	MAINS CORD (+FUSE) for UK
⚠	R4822 321 10249	MAINS CORD
	R4822 320 50377	ANTENNA cable
	R4822 321 63002	SCART cable

SUB MODULES

R4822 214 12238	Cinch print rear
R3103 198 69940	QBOC1Cinch print front

⚠... Safety component, use only this type